DOCUMENT RESUME

ED 238 095 EA 015 765

AUTHOR Miano, Ruth D.
TITLE The Current Status of Excellence in American Public Education.
PUB DATE Jan 83
NOTE 79p.; Submitted in partial fulfillment of requirements for course S591--Exit Project, Indiana University at South Bend. Appendixes D and E may not reproduce due to small print.
PUB TYPE Reference Materials - Bibliographies (131) -- Information Analyses (070)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Annotated Bibliographies; *Educational Assessment; Educational Trends; Elementary Secondary Education; Futures (of Society); Global Approach; Higher Education; Literature Reviews; *Mathematics Education; *Science Education; *Teacher Education

ABSTRACT

Adding support to the view that the United States' educational system is falling behind that of other nations are 97 annotations from a variety of sources that provide a review of current trends. The annotations are presented in five sections. Section 1 focuses on current trends in the teaching of mathematics and sciences and on teacher training for these disciplines. Section 2 examines attitudes and perceptions of students, teachers, and administrators toward these disciplines. The global implications of these shortcomings are addressed in section 3, and section 4 contains 21 annotations about specific programs to improve teaching and learning in these disciplines. In section 5 are excerpts of views on issues facing secondary schools in the 1980s stated at a National Association of Secondary School Principals conference. Other elements in the document are a glossary of terms, a six-page summary with conclusions, nine recommendations, and a chronology of events affecting American public education. (MLF)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Ruth D. Miano
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ED238095

THE CURRENT STATUS OF EXCELLENCE IN AMERICAN PUBLIC EDUCATION

BY

RUTH D. MIANO

Study Directed
by
Charles R. DuVall, Ph.D.

Submitted in partial fulfillment of the requirements
for the course S591--Exit Project
Indiana University at South Bend
January, 1983

EA 015 765

TABLE OF CONTENTS

	Page
INTRODUCTION	1
Statement of the Problem	5
Purpose of the Study	5
Organization of the Study	6
Glossary	7
ANNOTATIONS	14
Current Trends in the Teaching of Mathematics, Sciences, and Languages, and in Training of Teachers for these disciplines	14
Attitudes and Perceptions Regarding Education in Mathematics, Sciences, and Foreign Languages	22
Global Implications	32
Specific Programs	40
Issues Confronting Secondary Schools in the 1980's	47
From the National Perspective	47
From the Local Perspective	49
From the State Perspective	51
SUMMARY AND CONCLUSIONS	53
RECOMMENDATIONS	59
BIBLIOGRAPHY	60
APPENDICES	67

INTRODUCTION

If the educational slogan of the 1960's was National Defense, of the 1970's, Equity in Education, then the slogan of the 1980's is Excellence in Education (Thomson: 9). Excellence is an illusive term, one which means different things to different people, but it is the driving concern which causes us to seek solutions to our growing knowledge gap, our teacher-shortage problem in mathematics, sciences, and foreign languages, and our competition for world leadership.

We are tempted to solve our problems the way other political systems, such as the seemingly more successful Japanese and Soviet systems, handle theirs: enforce conformity. The experiment of democracy, embodied as it is in the very existence of the United States, dared to take the risk of possible educational mediocrity by setting its goal on providing opportunity for educational advancement to all citizens equally (Gardner: 88).

Americans have always loved the concept of equality. As an emotional political slogan, its meaning seems clear. As a guiding principle for articulating specific goals in an educational system, its meaning is blurred (Gardner: 13). The concept of equality was carried to an extreme in this country during the Jacksonian era when even licensing physicians was lax: it was felt that rigorous requirements would be undemocratic because it would bar too many would-be physicians from the field (Gardner: 16). China became confused about equality during the Cultural Revolution, when policies required the qualified teaching professors to do their share of work in the fields, and students passed through the educational system without achieving. They suffer now because they lack qualified personnel to teach in their schools (Smith: 427).

The hope of democracy in offering the opportunity of education to all, was that the most talented would filter up through the system, and that the overall national literacy would be strengthened. It sought to insure against reserving education as an elitist right for a privileged few, whether that privilege had its roots in aristocracy or in the intellectual cream of society (Gardner: 12). We have tried to convince the public that educational achievement could be translated to occupational success (Randour: 189), yet the recent unemployment figures have caused speculation about whether our goals of educational achievement were properly directed. Perhaps one of the most disturbing outcomes of the present recession is the apathy that we see in our students and public towards education (Swartz: 602). Alistair Cooke did not foresee this turn of events in 1952 when he made the statement: "America may end in spontaneous combustion, but never in apathy, inertia, or uninventiveness." (Gardner: 20). We have to ask ourselves whether we are nurturing the kinds of talent, at all levels of ability, that will create the great civilization that we believe democracy can achieve.

The very stratification democracy set out to eliminate in its educational system, seems to be emerging in the form of an educated elitist few. The public nurtures this to a certain extent, by its willingness to leave the study of mathematics and science to the experts. It does not seem to make the connection between these studies and a public responsibility for what goes on behind the closed doors of laboratories where nuclear weapons are being developed for human destruction, for protecting our environment, and for solving world hunger problems. It seems content to let these matters be solved in the political arena. Even though Hiroshima changed the 19th century attitude of separation of science and politics to one of support for scienti-

fic research and voice in politics, the support went to the experts at the top. According to Gerald Holton, Professor of Physics and History of Science at Harvard University, the mistake was "not insisting that as part of the deal this should first of all be an educated society within which research then would have a primary place. (Otherwise) the citizenry will split itself off and so eventually lose the power for rational decisions which safeguard their liberties." (Brinckerhoff: 605).

America goes through self-destructive phases such as McCarthyism and Watergate, but it seems to possess an "elastic-deformation" which allows it to reach a point where it snaps back to sanity (Brinckerhoff: 611). Thus historically we have demonstrated our ability to identify and deal with our shortcomings as a nation. Our present difficulties are heightened by global involvements. Many useful purposes can be served by increasing our awareness of other countries, learning their languages, and getting involved in their educational development. Developing nations are trying to cope with the all-too-familiar problems that we have known since we embarked upon the experiment of training responsible citizens. If we trust democracy, we will share its ideals with these growing nations. Our survival depends on it.

Since the 1890's, we have acknowledged the role that an effective educational system plays in the future of the nation (Osborne: 155). As we have entered the 1980's, we are in search of excellence. We seek to inspire our discouraged citizens to press forward, for "excellence is not an achievement of demoralized or hopeless individuals." (Gardner: 124). Only time will tell where our democratic philosophy of education will lead us. That we can look for our weaknesses and devise ways of shoring up our deficiencies must surely be a strength. That our country is so extensive and diverse, that we are becoming more involved with global concerns, and that

the machinery of change moves so slowly, are realities we must face. Gardner, author of Excellence, has given us this point to ponder: "If a society holds conflicting views about excellence - or cannot rouse itself to the pursuit of excellence - the consequences will be felt in everything it undertakes." (Gardner: xvii).

STATEMENT OF THE PROBLEM

Education is the system which conditions and trains the young people of a society to take their places in that society as responsible citizens. The United States has traditionally concerned itself with producing responsible citizens of the United States. The age of technology has surmounted the obstacles of transportation and communication to the extent that the nations of the world are inextricably bound to one another in financial affairs, in meeting food and fuel needs, and in the preservation of life itself. Thus the future citizen of the United States, or of any country, must take his or her place as a responsible world citizen. Despite the need for cooperation, communication, and credibility, the United States appears to be allowing its educational system to fall behind that of other nations in the rigor of its mathematics, science, and language mastery. This situation was the basis for this research.

PURPOSE OF THE STUDY

The purpose of this study was to provide a review of current trends in teaching of mathematics, science, and languages in the public schools, to compare these with models outside the United States, and to provide some suggestions for restructuring some programs of our system to meet the more comprehensive needs of our students today.

ORGANIZATION OF THE STUDY

The first section focused on current trends in the teaching of mathematics, sciences, and languages, and in training of teachers for these disciplines.

The second section examined attitudes and perceptions on the part of students regarding studying these disciplines, on the part of colleges and univeristies toward training teachers for these disciplines, and on the part of administrators regarding hiring qualified teachers with experience in these areas.

The third section examined the global implications of maintaining or reverting to an isolationist attitude towards these considerations.

The fourth section reviewed specific programs which were addressing these concerns.

The fifth section presented the views on issues facing secondary schools in the 1980's as stated at a National Association of Secondary School Principals conference in St. Paul, Minnesota.

Within the first four sections, the annotations are presented in alphabetical order. In the fifth section, the annotations are in order of presentation at the conference.

GLOSSARY

AAAS -- American Association for the Advancement of Science (see Appendix C)

Aggregated data -- data grouped in large categories for the purpose of examining overall data without examining a trend from one level to the next. Such data is often used for politicizing information. For example to gather statistics on the increase of the number of women entering the work force is meaningless unless the information is broken down to indicate trends toward entrance into traditionally male-dominated fields, taking only part-time jobs, or changing the ratio of women to men entering the work force. (Randour: 191) (see disaggragated data)

AMS -- American Mathematical Society (see Appendix C)

AWM -- Association for Women in Mathematics. This organization was formed to improve the status of women in the profession and to encourage more women to study mathematics. (see Appendix C)

Androgyny -- the blending of both conventional masculine and feminine traits into one personality. (Robinson: 13)

Attitudinal research in education -- research which seeks to determine the correlation between attitude, learning and achievement. (Whitaker: 217, see Appendix A)

Behavior analysis research -- a branch of educational research in which a major focus has been "to translate informal practices of good teachers in a technology of empirically-tested procedures for enhancing the learning process." (McKenzie: 1)

Cognitive psychology -- the science of thinking. Among the different approaches to this science are two which strongly influence the American approach to curriculum planning: information-processing theory (IPS), which is a model of thinking that parallels the working of the human mind with the functioning of a computer, Piaget's theory, which holds that cognitive growth is generated by equilibrium or self-regulation. Piaget presented "a kind of problem-solving process whereby a person resolves discrepancies in given information to produce a self-consistent representation of the information in the long-term-memory (LTM)." Thus the teaching strategy stemming from this theory is one of problem-confrontation. (Hestenes: 236-9)

Competency and proficiency testing -- a procedure introduced "to provide local school districts with the control and the responsibility over their own instructional programs; the process of establishing well-defined goals for both teachers and students, and measuring progress toward such goals". (Nelson: 20)

Note: Nelson noted that in reality tests developed by the states seldom addressed local needs and thus measured only selected objectives. The result has been that test scores have been used not as instruments of improvement for individual schools so much as a ranking procedure for the schools in the state. (Nelson:20)

Dialectical materialism -- a philosophy subscribing to the fact that internal processes of thought, reasoning,and learning, and external practices provide the learner with the contradictions and conflicts which will generate the change called learning. Contrasted to this is the American approach to learning which identifies mental processes as separate and distinct from the external social and historical practices. (Popkewitz: 421)

Disaggregated data -- data grouped in small categories at different levels in order to determine trends, progress (or regress), and actual outcomes. (Randour: 191)

(see aggragated data)

Equal Pay Act of 1963 -- "established the first statutory prohibition against sex discrimination in employment. (Randour: 189, see Appendix C)

First professional degree -- degree such as dentistry, medicine, and law which requires at least two academic years of college work before entrance and at least six academic years of college work for completion. (Randour: 191)

Four Modernizations -- the guiding principles for China's current reform: science/technology, agriculture, industry, and national defense. (Baker: 162)

Global issues -- those issures facing all nations of the world signifying the inter-dependency of nations upon one another.

IAEWP -- International Association of Educators for World Peace (see Appendix C)

IEA -- International Association for the Evaluation of Educational Achievement. The aims of this organization are: "to undertake educational research on an international scale; to promote research aimed at wxamining educational problems common to many countries; to provide the means whereby member centers can undertake cooperative projects. It has conducted a cross-national survey of achievement in science, mathematics, reading comprehension, literature, English as a foreign language, French as a foreign language and civic education. (Akey: 562)

Information Age -- refers to the 21st century, the age in which micro-processors, computers, and technological advancements, unknown at this time, will drastically alter education." (Cogan: 432)

Instructional accountability -- a relatively recent development in curriculum theory which holds that "those assigned the responsibility of teaching should be accountable for certain learning objectives and basic skills." (Nelson: 20) This could be thought of as an educational application of the French philosophers' Social Contract of the 18th century, the theory which proposed that "the governed should accept a leader so long as the governed are benefited, but when the leader abuses or fails to benefit the governed, then the obligations are voided", and the leader must be replaced. (Thomson: 7)

Instrumental mathematics -- a term used to describe a quick-answer approach to mathematics. It is concerned with how, not why. Its emphasis is upon memorizing formulas and rules in which applications produce ready-answers. It is content to let mathematics be a sum of unrelated parts rather than a coherent whole. (Galbraith: 107)
(see relational mathematics and mathematical vitality)

Likert scale -- a scale used to measure or assess attitude. (Clark-Meeks: 317)
(see Revised Math Attitude Scale)

Longitudinal study -- a study based on the collection of data at different times over specified time intervals. (Raelin: 232)

MAA -- Mathematical Association of America (see Appendix C)

Mathematical vitality -- the quality that implies that mathematics is an on-going activity, an active way of thinking and learning. (Galbraith: 107)

NCTM -- National Council of Teachers of Mathematics (see Appendix C)

NEA -- National Education Association (see Appendix C)

NSF -- National Science Foundation, an "independent agency in the executive branch of the federal government concerned primarily with the support of basic and applied research and education in the sciences. Funds scientific research in mathematic al, physical, biological, engineering, social and other sciences, including unclassified research activities in matters relating to national security and international cooperation; fosters the interchange of scientific information; supports the development and use of computers and other scientific methods and technologies." (Akey: 508, see Appendix C)

NSTA -- National Science Teachers Association (see Appendix C)

NSSE -- National Society for the Study of Education (see Appendix C)

NTA -- National Teachers Association (see Appendix C)

Peer tutor -- a peer who functions as a manager or tutor to alter poor behavior or to imporve the achievement of a classmate. (McKenzie: 1) (see Appendix B)

Pluralistic society -- a society such as our own which is composed of many ethnic groups, differences in religious persuasion, and diverse political sentiments.

Pre-College Mathematics and Science Teachers Assistance Act -- one of several proposals before Congress, designed to alleviate the problem of poorly prepared college mathematics and science students. (McCormack: 25, see Appendix C)

Professional knowledge base -- the articulation of the specific knowledge which must be attained for entrance into a specific profession. (Corrigan: 35)

Note: Corrigan and Imig felt that for the educational profession, this is not well-defined.

Project Synthesis -- a 1977 NSF project designed to assess the status of science education in the United States. (Yager: 10, see Appendix C)

Pygmalian Effect in education -- the effect of stereotyping sex roles on the achievement of students in school, especially with respect to the stereotype that boys are better in mathematics than girls. (Ernest: 8) Note: Robinson suggested that androgynous characteristics in teachers would be one way to cope with this effect. (Robinson: 13) (see androgyny)

Relational mathematics -- a term used to describe a structure-oriented approach to mathematics. It is concerned with why, when, and how. It is sensitive to the need for consistency and accuracy in the use of its terms, structures, and methods. It stresses the on-going quality of mathematics. (Galbraith: 107) (see instrumental mathematics and mathematical vitality)

Revised Math Attitude Scale -- the specific Likert-type scale constructed by Lewis Aiken and Ralph Dreger to measure attitude toward mathematics. (Clark-Meeks: 317)

Satori -- a Japanese term referring to the highest point of learning, the sudden flash of enlightenment that comes only after long intensive study. (Schiller: 66)

SESE -- Search for Excellence in Science Education. (Yager: 1982, see Appendix C)

Scientific Manpower Commission -- founded in 1953, this organization is composed of two representatives from each of 13 major scientific groups. The purpose was "to handle all scientific manpower questions of general interest and concern in behalf of the scientific societies. (Akey: 47)

Second NAEP study -- a study done on thirteen and seventeen year olds, designed to assess achievement in mathematics and language. Measured objectives developed for this study included five content areas and four cognitive-process areas. (Fennema: 55, see Appendix C)

SSMA -- School Science and Mathematics Association (see Appendix C)

Theories of Tyler and Bloom -- theories of education developed and taught by Ralph Tyler and Benjamin Bloom at the Curriculum Development Center at the University of Chicago, which made their way in an almost pure form into Israel's educational system as a result of founding director, Shevach Eden, studying at the university at the time. The theories proposed that curriculum should consist of "a series of well-defined stages in pre-determined sequence, all carried out by professionals". (Zisenwine: 416)

WME -- Women and Mathematics Education. This association is composed of individuals "concerned with promoting the mathematical education of girls and women". (Akey: 590, see Appendix C)

ANNOTATIONS

CURRENT TRENDS IN THE TEACHING OF MATHEMATICS, SCIENCES, AND LANGUAGES, AND IN TRAINING OF TEACHERS FOR THESE DISCIPLINES

Alden, Elaine F. and Seiferth, Berniece B., "Women in Science and Technology," The High School Journal 64:322-325, May, 1981.

Though more women entered the job market with post-secondary training, relatively few entered areas of science and technology. The writers felt this might be attributable to stereotyping of role expectation. Respondents in a survey on student perceptions of barriers to pursuing a scientific career, cited difficulty of preparation, conflict between home and career, lack of encouragement from counselors and teachers, and lack of information about science and technology careers for women. A higher proportion of women graduated in science fields in the 1920's than in any decade since. The writers felt that more encouragement from families made women pursue careers in science and technology. Present trends showed an increase in women entering these critical areas.

Armstrong, Jane M., "Achievement and Participation of Women in Mathematics," The Education Digest XLVIII:40-43, April, 1982.

Based on the findings of two national surveys, the second NAEP conducted during 1977-1978, and the Women in Mathematics Project conducted in 1978, Armstrong stated that there were no significant differences between male and female students' mathematics capabilities as they entered high school. If anything, girls demonstrated slightly higher capabilities at age thirteen than boys at that age. The same results were found following the early high school mathematics courses of algebra and geometry. Significant changes were detected in advanced high school mathematics courses: sex differences occured not only in participation - enrollments - but also in performance and achievement especially in mathematics application problem-solving. More research was recommended to discover reasons for these findings. Armstrong suggested the possibility of differences in out-of-school experience as one variable that could have significant impact on these performances.

Brinckerhoff, Richard F., "Talks with Great Teachers: Gerald Holton," The Physics Teacher 20:602-611, December, 1982.

Appointed by Secretary Bell to the National Commission on Excellence, Holton brought with him a wealth of experience and wisdom gained through education in the United States and Europe, experience as a university teacher, and through personal research in methods of teaching and historical contexts of education. In this interview, Brinckerhoff gleaned information from Holton regarding his knowledge of the philosophical differences between Eastern and Western science: Holton stated that the existence of monotheism in Western science was the most distinguishing difference, since Eastern science seemed to content itself with cataloging observations. Noting that Hiroshima had jarred the world out its 19th century tendency to separate science and politics, Brinckerhoff asked Holton how science teachers might meet their obligation of impressing students with the consequences of science upon society and ethics. Holton felt that nothing of significance could happen in the classroom unless scientists themselves became actively involved in the process of training the children and teachers in every possible way: by writing children's books that correctly presented scientific principles, by developing curriculum, and by taking an active part in training teachers. Whatever was done on a mass scale had to start from a national intellectual committment, then be carried into the political arena by informed leadership. Holton felt that the post-Sputnik science push was political and lacked the intellectual committment necessary to keep it alive.

DeVault, M. Vere, and Weaver, J. Fred, "Forces and Issues Related to Curriculum and Instruction, K-6," in A History of Mathematics Education in the United States and Canada, National Council of Teachers of Mathematics, Washington, D.C., 1970, 557 pp.

Psychology had its share in the confusion regarding the justification for teaching mathematics in public schools. The theory of faculty psychology which was popular in the 19th century, justified teaching mathematics because it was considered useful in mental discipline. With Thorndyke and Dewey, educational theory turned to an emphasis on what was relevant to the student directly. The turn of the century therefore brought new questions regarding the justification of teaching mathematics.

Fox, Lynn H., Brody, Linda, and Tobin, Dianne, Women and the Mathematical Mystique, Johns Hopkins University Press, Baltimore, 1980, 211 pp.

More and more careers particularly in the professions required competence in mathematics. Thus it was essential for talented young students to be encouraged to enroll in advanced mathematics courses to acquire strong mathematics proficiency so that any college or career option might be open to them. This advice was particularly important for talented young women who for various reasons tended to avoid advanced mathematics courses. The writers stated that educators had the responsibility for intervening in the continued perception that advanced mathematics was meant to be male-dominated. Not all mathematically gifted students needed to become mathematicians or physicists, said the writers, but the current trends tended to indicate that mathematics was relevant to a wide variety of majors and career choices. It was suggested that career education might have a significant impact on the numbers of young women electing to enroll in advanced mathematics courses.

Frye, Charles M., "Who Runs the Schools?," Newsweek XCIV:13, September 3, 1979.

Lower SAT scores, functionally illiterate high school graduates were the trend in the last fifteen years, stated Frye. The control of the educational system lay in the hands of four major groups: graduate schools of education, administrators, the Federal government, and state and local administration groups. The result was a bureauocratic system that had over that period of time, increased its turnout of teachers by 300 percent, despite the drop in school populations. Frye was even more discouraged by the statistics which indicated that those entering education were among the weakest of our college graduates. In his own experience, of the nineteen high school principles under whom he had served, six were physical education majors.

Goldhammer, Keith, "Hallmarks for Excellence in Teacher Education," Journal of Teacher Education XXXII:25-29, September-October, 1981.

Contemporary society demanded the achievement of specified levels of skill and knowledge for its children in order to assure them full participation in society. Goldhammer emphasized the problem facing our society to be due to the alarming number of students graduating from our high schools ill-equipped to participate in further education or employment. He sounded a challenge to education departments across the nation to face this problem by devoting energy to teaching teachers to teach towards excellence, to see that education programs were solidly rooted in knowledge of teaching and learning, as well as grounded in a rigorous command of subject matter taught, to assure preparation of teachers who possessed professional competency in a pluralistic society, to provide continuous monitoring of all programs, possibly through job-exchanges between schools, colleges, and departments of education. The opportunity of developing potential fully was foundational to our growth as a democratic nation, and as such "education is a servant of the American concept of freedom and equality".

Hazard, William R., "Educational Malpractice," The Education Digest XLVIII: 24-25, October, 1982.

Allowing students to pass through thirteen years of education without learning to read, or forcing a child to be in a classroom or retarded children for thirteen years without re-evaluating the situation from time to time, were subjects of concern in this article. Hazard asserted that deprivation of education to the individual constituted what he termed "educational malpractice". He felt that in the cases cited there was definite evidence of "breach of a duty owed", thus malpractice was committed in the truest sense of the word. Remedy for this flaw in American school systems would perhaps lie in sensitivity on the part of educational personnel of such liability for malpractice that can result from depriving a student of his or her right to a suitable education.

Hirstein, James J., "The Second National Assessment in Mathematics: Area and Volume," The Mathematics Teacher 74:704-708, December, 1981.

Hirstein pointed out that one of the main reasons for the teaching of mathematics was to convey concepts of measurement to the students not only for the purpose of providing applications of arithmetic but also for forming a basis for size-judgements of objects encountered in everyday life. NAEP questions designed to reflect students' abilities to relate concepts of area and volume showed that students were conceptually confused about these topics. Hirstein felt that this was an outcome of concentrating too heavily on arithmetic manipulation in classroom instruction, without insisting upon a grasp of concepts.

Hudson, H.T., and Rottman, R.M., "Mathematics Ability of Beginning Physics Students," The Physics Teacher 18:305, April, 1980.

The writers reviewed the results of a mathematics diagnostic test designed to assess readiness for introductory pre-professional physics at the University of Houston. The results were broken down topically. It was noted that of the students taking the test, 75 percent had credit for elementary analysis and 35 percent had had some calculus. The results suggested that teachers of introductory physics courses should have their students take remedial work to acquire adequate mathematics skills prior to enrollment in physics, in the writers' judgement.

Keisling, Phil, "How to Save the Public Schools," The New Republic :27-32, November 1, 1982.

Keisling reporting the findings of James S. Coleman, Thomas Hoffer, and Sally Kilgore, related that students in the typical private school - parochical with larger classes, lower-paid teachers, and fewer resources - achieved more than those in the average public school. Keisling noted that the two major teachers' unions American Federation of Teachers (AFT) and National Education Association (NEA) used the argument of poor salaries as a reason for poor quality of teacher personnel. Raising teacher salaries could not improve non-existent quality, and would simply encourage the mediocre to settle back to enjoy the profits, alleged Keisling. As a short-term inducement for acquiring qualified personnel in mathematics and science, higher pay might be the only solution, however.

Lagowski, J., "Patterns in Education," Journal of Chemical Education 59:893, November, 1982.

Lagowski quoted statistics that compared the spending of industry on training for jobs and that of the educational system on teaching. The greater amount spent by industry implied that some of the expenditure was remediating areas ineffectually covered by the educational system. Lagowski defended the educational system stating that its goals were broader and more far-reaching than those of industry. While a natural tension would always exist between education and industry, in Lagowski's opinion, industry had a stake in the traditional broad-based goals of education. In fact industry itself assisted in formal educational systems by donating gifts of equipment, salary supplements, and information input. Thus even though industry's short-term goals met present - or immediate - economic realities, thought was being given to the fact that education and industry were interdependent.

Lin, Herbert, "Learning Physics vs. Passing Courses," The Physics Teacher 20:151-157, March, 1982.

This study collected data by interviewing students , and was addressing itself to ways of improving the teaching of physics in high school. It found that student performance was determined by the specific tasks for which teachers explicitly held the students responsible - examinations and problem sets - rather than the general goals of the teacher - that of conveying appreciation of physics in a broad context. Strategies sought by students in problem-solving were opposite to those employed by physicists: rather than working from first principles, students tended to employ "random search", one-step strategies. Thus students preferred to work from special cases rather than deriving many specific relations from a few general principles. Lin enumerated specific intervention strategies that he had found successful with his own students in addressing the problem of students simply learning the way to get quick answers rather than learning the ongoing process of physics.

Long, Sandra M., "An American Profile: Trends and Issues in the 1980's," Educational Leadership 39:460-464, March, 1982.

Societal changes in family structure, migrations to the Sun Belt states, migrations away from urban areas, the increase in the population of those 65 and older, the large number of women entering the work force, increases in enrollments in nursery school and college, and a rising birth rate were cited by Long as the trends in American society that would be foundational to necessary modifications in our educational system. How meaningful and productive our future is would depend on decisions made by educators relative to the needs of our students who would be participants in that society.

McKenzie, Malinda L., and Budd, Karen S., "A Peer Tutoring Package to Increase Mathematics Performance: Examination of Generalized Changes in Classroom Behavior," Education and Treatment of Children 4:1-14, Winter, 1981.

Behavior analysis research in education, the branch of educational research seeking to capture the methods employed by successful teachers and to translate them into methods that could be learned by prospective teachers, was the foundation of this study. The writers put together a "peer treatment package" to be used on two students who demonstrated poor behavior and poor performance. Immediate and substantial improvement was demonstrated when peer tutoring was implemented according to the well-defined procedure of the package. Specifically, increases in accuracy of mathematics performances were noted, as well as improved classroom behavior. Tutors appeared to profit from the experience of managing their own academic standing while helping the performance of the peer, and the teacher was free to attend to the other classroom needs. The study demonstrated that this teaching method could be implemented as a means for enhancing the learning capabilities of the entire classroom.

Opel, John R., "Education, Science, and National Economic Competitiveness," Science 217:1116-1117, September, 1982.

Half of all high school juniors and seniors took no mathematics courses, fewer took any science, and still fewer took physics. Tens of thousands of students entering engineering schools required remedial work in mathematics. Opel stated that there were 17,000 unfilled engineering positions. The production of Japanese engineers doubled between 1965-1977. That of the United States fell in that time period. The number of new mathematics teachers fell by 78 percent in the 1970's. The number of new science teachers fell by 64 percent. Unqualified personnel were used to fill these positions. Further signs of slippage in U.S. education were shown in the SAT scores of education majors. These were declining one and one-half times as fast as the average population.

Raelin, Joseph A., "A Comparative Analysis of Female-Male Early Youth Careers," Industrial Relations 21:231-245, Spring, 1982.

Raelin reported the findings of a longitudinal career model focusing on difference in variable career paths between young men and women. The study found that there were fewer career paths for women than for men. Education, training, and intelligence were tremendously important for the young woman to obtain the crucial first job, the one which Raelin felt had the strongest implications for the young woman's career. Committment and aspirations played hardly any role in the young women's careers, while these played strong roles in young men's careers, according to this study. Women, Raelin felt, tended to "hold jobs as opposed to having careers". Raelin noted that the study began before equal employment opportunity legislation or the women's movement. Thus a study modeled on this one, following these events, would not yield the same results, in all probability. In any case, the writer recommended overcoming the old social stereotypes even further so that women would seek career choices and committments.

Randour, Mary Lou, Strasburg, Georgia L., and Lipman-Blumen, Jean, "Women in Higher Education: Trends in Enrollments and Degrees Earned," Harvard Educational Review 52:189-201, May, 1982.

This article reported the findings of a longitudinal study - 10 to 20 years - based on disaggregated data. The study was designed to determine the status of women in higher education in bachelor, masters, doctoral, and first professional degree programs, to ascertain trends and actual progress, if any, of women in education. It was found that more and more women entered higher education, that the percentage of women earning degrees was increasing, but that most fields continued to be "gender-segregated". The writers noted that history had shown that when large numbers of women had entered male-intensive fields, such as typists, elementary school teachers, and bank tellers used to be, men tended to retreat to less sex-integrated fields. It was noted that such trends had served to maintain sex-segregation and continued lower wages for women. In short, the higher wages followed the men. Recent gains by women in higher education were attributable to effective political mobilization. In conclusion, the writers found more women in two-year colleges, in less-well-funded institutions, enrolled as part-time students, achieving at lower grade-levels, and most women had not achieved parity with men.

Swartz, Clifford E., "Is This Generation Different?," The Physics Teacher 16:602, December, 1978.

Reflecting upon the danger of jumping to the conclusion that the mathematics students of the good old days were superior to those today, Swartz nevertheless pondered the problem of teaching students who were confident that they understood concepts, but were incapable of performing the simplest arithmetic computations. Even though Swartz was willing to concede that today's students were perhaps advanced in a new direction - not yet assessed- he was nevertheless discouraged when he compared a recent calculus-physics class with one he taught in 1965. When he pursued the matter further, he discovered that his feelings were shared by secondary school teachers around the country and university colleagues alike. The consensus seemed to be that today's students were unradical, pleasant, well-adjusted socially, and passive.

Whitesitt, John, "Mathematics for the Average College-Bound Student," The Mathematics Teachers 75:161-168, February, 1982.

Whitesitt noted the concern that mathematics educators had for increasing numbers of college students who had not enrolled in college-bound courses at the secondary level. What the average college-bound student should have taken in high school was four years of mathematics including at least pre-calculus mathematics. What the average student who arrived at college had actually taken fell far short of this, thus creating a serious deficiciency in preparedness for college mathematics. Whitesitt concluded by stating that students who went to college without a minimum of two years of algebra and one year of geometry continued to be at an almost insurmountable disadvantage in mathematics as well as any science related careers.

Williams, Robert T., "Beneath the Surface of the Mathematics Teacher Shortage," The Mathematics Teacher 74:691-694, December, 1981.

Williams, in his study of the North Carolina mathematics teacher situation, discovered that only 55 percent of the state's mathematics teachers were certified to teach the subject. He also discovered that in 1980, there were 460 qualified mathematics teachers employed in North Carolina's school system who were NOT teaching mathematics. Defendents of the low percentage of mathematics positions that were filled by certified teachers for that field, held that only college-preparatory mathematics courses needed to be taught by such teachers. The problem with this view, as Williams pointed out, was the fact that North Carolina's teacher-certification system was based "on the presumption that all secondary mathematics courses should be taught by teachers certified in mathematics". Thus even though principals had succeeded in getting a "body into every classroom" in time for school opening, what really existed below the surface was a shortage of close to 1000 mathematics teachers. This only complicated the problem more since it was rare that such teachers were unseated if and when the qualified did come knocking on school doors. Williams expressed that the situation would only change through pressure groups, boards of education, and legislations.

ATTITUDES AND PERCEPTIONS REGARDING EDUCATION IN MATHEMATICS, SCIENCES, AND FOREIGN LANGUAGES

Chavez, Annette, and Widmer, Connie C., "Math Anxiety: Teachers Speak for Themselves," Educational Leadership 39:387-388, February, 1982.

Interested in whether there was any truth to the rumors that elementary teachers did not like mathematics, that many of them had opted to teach in elementary school rather than in higher grades because mathematics requirements were not as demanding, and that these attitudes were more prevalent among female teachers than among male teachers, the writers of this article examined the responses to a questionaire designed to answer these questions. They found that teachers in elementary schools for the most part did not possess these attitudes. Of course, there were those who were biased in these negative ways, but it was the writer's opinion that intervention was possible through open discussion and the designing of specific programs that could relieve such anxiety where it existed.

Clark-Meeks, Loretta F., Quisenberry, Nancy L., and Mouw, John T., "A Look at the Mathematics Attitudes of Prospective Teachers in Four Concentration Areas," School Science and Mathematics LXXXII:317-320, April, 1982.

Confrontation with mathematics brought strain, feelings of dislike, fear, insecurity, and confusion, according to this study performed by the writers. The instrument used in this study was a likert-type scale, the Revised Math Attitude Scale, designed to assess attitude by analyzing responses to mathematics-related items keyed with choices ranging from strongly agree to strongly disagree. Two main objectives were defined in the study. The first objective was to discover if there were any differences in mathematics attitude among teachers in the four areas: pre-school, kindergarten through third grade, fourth through ninth grades, and special education. No significant difference was found. The second objective was to determine the validity of the instrument used. The responses clustered around the extremes rather than the center, indicating definite reactions. Thus it was felt that the scale had high validity for this study.

Corrigan, Dean C., and Imig, David, "Turning Teacher Education Around," The Education Digest XLVIII:34-35, October, 1982.

These writers concurred in their feeling that teacher-education was the best it had been in history. The dilemma lay not in the inability to train, but in the fact that for some reason adequate preparation was not taking place. Several suggestions were proposed. One way to alleviate the problem was to develop selection programs designed to attract the most capable high school students. Setting up more attractive loan programs for prospective teachers was another suggestion. Provision of incentives and support for the kind of research needed, and expansion of the professional knowledge base were drastically needed in the field of education.

Ernest, John, Mathematics and Sex, Triple R Press, Goleta, California, 1976, 30 pp.

Attitudes on the part of teachers that expect boys to achieve better in mathematics than girls, referred to as the "Pygmalian Effect" in education, was prevalent in the American school system, according to a survey carried out by Ernest in several elementary education classes at University of California, Santa Barbara. Ernest and his research team found no psychological studies which indicated that women were less capable. The writer concluded that the reason so few women entered mathematics-related professions was a case of their living up to early educational expectations.

In a sample of seventy-five prospective elementary teachers, Ernest was discouraged to find that twenty-six percent were indifferent to mathematics and fourteen percent hated the subject. Although there were 11 men and 65 women in the sample, the above percentages seemed to be consistent for both sexes. Those hating mathematics identified that the chief reason for their distaste was the influence of a particular teacher in early education. Thus even though the sample verified that teacher-attitude had detrimental effects on students, these future teachers were carrying these negative attitudes into classrooms to affect their students in the same way.

Fennema, Elizabeth and Carpenter, Thomas P., "Sex-Related Differences in Mathematics: Results from National Assessment," The Mathematics Teacher 74:554-559, October, 1981.

Reporting the sex-related differences evidenced in the second assessment of NAEP, the writers noted that there continued to be little distinction between male and female achievement at ages 9 and 13. However, this was not true among 17-year-olds where it was found that males achieved better than females, especially in more complex problems. The writers pointed out that these results were based on students who had taken the same mathematics courses. Thus the recommendation made at the first assessment, though implemented, had not narrowed the gap between male and female achievement. The writers felt that the assessment failed to identify reasons for the differences. Schools and teachers needed to find out about intervention programs designed to address this problem in order to provide an education in mathematics equitable to both male and female students.

Galbraith, P. L., "The Mathematical Vitality of Secondary Mathematics Graduates and Prospective Teachers: A Comparative Study," Educational Studies in Mathematics 13:89-112, February, 1982.

Learning pre-digested mathematics and learning for the purpose of creating new mathematics, the difference between "instrumental" and "relational" mathematics, were the subject of this study. "Mindless mathematics" produced students incapable of correctly applying rules, theorems and algorithms after as much as twelve years of school in the Austrailian school system. More disturbing was the fact that eighty percent of those involved in the survey intended to become mathematics teachers. Galbraith reflected on the confusion inherent in the two opposing definitions of the term "mathematics", and concluded that many teaching candidates entering the field were strictly instrumentalist rather than relationist. It was Galbraith's view that this state of affairs was cause for great concern as it robbed the subject of its vitality, and provided nothing more than a medium for transmitting mediocrity. A system which measured success on the basis of instrumental performance would effectively inhibit the growth of relational mathematics. It was Galbraith's feeling that the issue must be addressed as it was one which affected all areas of learning: "the major concern for worry was that teachers had in many cases never learned to learn".

Greer, Peter R., "Letting Administrators Decide Who the Best Teachers Are," The Education Digest XLVIII:26-27, October, 1982.

Greer sounded the warning that unless education found the courage to select and keep only the finest teachers, our American educational system was doomed. Greer noted that the process was hampered by collective bargaining agreements and the insistance that the seniority-rule prevail according to most reduction-in-force clauses in most public school teacher contracts. Principals were the most qualified judges of teacher excellence, in the writer's opinion, and the argument that favortism and ulterior motivation would reign if principals were to choose "the best", did not convince the writer. The majority of principals, he felt, were fair-minded individuals, and had the best interests of the students at heart. All school boards should alter the reduction-in-force clauses so that they would assure the school system of retaining the best teachers based on program needs.

Haladyna, Tom, Shaughnessy, Joan, and Shaughnessy, J. Michael, "A Causal Analysis of Attitude Toward Mathematics," Journal for Research in Mathematics Education 14:19-29, January, 1983.

This NSF funded research was designed to study the causes of mathematics attitudes toward mathematics in grades one through nine. Studies in the past dealt with the factors of aptitude, achievement, sex, and motivation, all of which were found to modify, to varying degrees, mathematics attitude. This study was directed toward two virtually unstudied variables, teacher quality and the learning environment. The results of the study were: that teacher quality was consistently related to mathematics attitude at all grade levels; that management-organization climate had little impact on attitude or motivation toward mathematics; and that social-psychological climate influenced mathematics attitude more as the student matured.

Harrison, Anna J., "In Search of New Initiatives," Journal of Chemical Education 59:713-716, September, 1982.

Harrison in her 1982 ACS Award in Chemistry Address, stated that science was two things: "a process of investigation and a body of knowledge generated by that process". Harrison asserted that most Americans appreciated the goods and services given to them through science and technology, yet the decision-making that went into appropriating public funds for this research was carried out with little understanding of science. Harrison held the position that both for the professional scientist and the non-professional, scientific education was a life-time business. The structure provided in the academic setting was to be augmented by "a life-time of less-structured experiences". An informed scientifically literate citizenry was necessary to build a strong nation in a world dependent on science and technology for its very existence, and in order to make sound moral judgments.

Hestenes, David, "Wherefore Science of Teaching?," The Physics Teacher 17: 235-242, April, 1979.

The responsibility for science education from kindergarten through graduate school rested on the university professor. Though few professors were aware of this impact, they were responsible for writing the textbooks, designing the curricula, and training the teachers. The professor, required to divide his or her time equally between teaching and research, relied too heavily on the ineffectual lecture method of teaching science. This method was copied by the students as they, in turn, took their places as instructors of science. Information processing theory and developmental psychology, two aspects of cognitive psychology, needed to be addressed in educational research as rigorously as other science research. In short, professors needed to know more about how students learn. The writer was adamant in his feeling that teaching and science research were competitive rather than complimentary activities for a professor to engage in concurrently. Each was a full-time committment in its own right. In conclusion, Hestenes asserted that teaching scientifically was the key to upgrading our science program.

Howard, James, "The Time for Basic Education," The Education Digest XLVIII: 8-9, September, 1981.

Howard noted that the time for choosing priorities in education was at hand for the United States. In an era of cutting back financially, schools were forced to re-evaluate all course offerings to make certain that children and adolescents were getting a sound worthwhile education. Goals held by Council for Basic Education (CBE) for the past twenty-five years were recommended as guidelines for school boards to consider in the selection of what was best for the future of U.S. education. These included:

1) Seeing that all students receive adequate instruction in English, mathematics, science, history, foreign languages, and the arts.
2) Seeing that students of special abilities were given opportunity to develop without wasting time.
3) Seeing that clear standards for measurement of achievement were defined.
4) Seeing that teachers were thoroughly trained in the disciplines to be taught.

The security and well-being of our nation depended on immediate attention to these concerns, asserted Howard.

Jones, Phillip S., and Coxford, Arthur F., "Mathematics in the Evolving Schools," in A History of Mathematics Education in the United States and Canada, National Council of Teachers of Mathematics, Washington, D.C., 1970, 557 pp.

Two historically significant quotes were presented in this article. They were from the Report of the American Commissioners of the International Commission on the Teaching of Mathematics issued in 1912:

"The American commissioners in 1912 noted tendencies in this country to omit difficult or obvious geometric proofs, to postpone difficult topics, to reduce the stress on manipulation in algebra while increasing the stress on (quick) solution of equations and applications."

"At the present time (1918) superintendents ... (in) the United States have been forced by public opinion to consider numerous radical changes in methods of secondary school education. If a high minimum standard of preparation were required on the part of each teacher, and the position of the teacher were made such as to attract in sufficient numbers the best talent in the country, other difficulties would disappear. Most countries considered in this bulletin have far higher standards that we with respect to teachers of mathematics in the secondary schools."

Kilpatrick, James J., "Our Vulnerability in Knowledge Gap," South Bend Tribune, December 13, 1982, p. 10.

Much was said on Capitol Hill regarding the missile gap, but Kilpatrick felt that this drew attention away from the knowledge gap which seemed to be widening to crisis level. The writer alleged that our schools were turning out graduates with only the most basic knowledge in mathematics, and who were "scientific numbskulls". Of some 21,000 public schools, only one-third offered calculus, fewer offered physics taught by qualified personnel. Enrollment in science courses declined over the past 20 years. Schools seemed to reflect rather than guide public opinion. Kilpatrick stated that last year, 42 out of 45 states reported teacher shortages in the fields of mathematics and science. Out-of-date science laboratories and inadequate facilities also contributed to the sad state of affairs. Even more disturbing was the fact that Japan and Soviet Union were not evidencing the same trends. Kilpatrick urged that the ignorance gap be recognized as a serious national problem.

Kirwan, Donald F., "Bruce Lindsay," The Physics Teacher 20:366-371, September, 1982.

While interviewing Lindsay, Emeritus Professor of Physics at Brown University, Kirwan asked what Lindsay thought of the quality of public education. Lindsay felt that teachers were coming out of colleges where preparation was rather weak, education did not pay high enough salaries to attract the best, and in general the standards of excellence were failing. Asked whether NSF had played an important role in upgrading the teaching of physics, Lindsay spoke from his experience of having taught in the program, stating that it was difficult to design a course suited to teachers for whom: graduate courses in physics were too challenging and undergraduate courses created problems of assigning graduate credit. He felt that NSF should still involve itself in supporting appropriate upgrading educational projects and purchasing certain physics equipment that could not be made inexpensively. Lindsay ended by stating that while good teaching and nurturance were needed, much of learning depends on the learner doing his or her share of preparing and studying.

McCormack, Patricia, "For Math Teacher, Jobs, Higher Pay," South Bend Tribune, September 25, 1982, p. 25.

Quoting NCTM president Willoughby, McCormack relayed concern regarding the effects of poor mathematics teaching on our "math-dependent" society. The shortage of qualified mathematics teachers and our potential - if not present - national "math stupidity" were cited by Willoughby as alarming to our future national defense and the running of our economy. Willoughby alleged that the most qualified mathematics personnel were attracted to higher-paying jobs of industry. Willoughby felt that the urgency of the situation was such that schools must offer higher salaries to qualified mathematics teachers. He expressed the hope that industry would join in the effort to upgrade the national mathematical expertise, and was optimistic about the Pre-College Mathematics and Science Teacher Assistance Act, one of several proposals before Congress, designed to alleviate the problem.

Nelson, David, Thompson, Reuben, and Dickens, Lloyd, "What Can Principals Do to Improve Competency, Proficiency Testing?," NASSP Bulletin 66: 19-29, May, 1982.

Competency and proficiency testing were a direct result of the emergence of the concept of "instructional accountability" popular in recent curriculum theory. The writers described in detail the principal's role in this important aspect of developing effective school programs. Specific tasks were detailed, but the underlying point was the necessity of faculty communication, clarification of goals, and definition of procedure. Teacher recruitment was recommended by the writers as an effective means of improving curriculum, and for this, principals were urged to improve their techniques of interviewing in order to better assess applicants' skills. They further stated that qualities desired should go beyond mere basic requirements, and should include wide backgrounds in language, reading, and/or mathematics. The principal was the most important person in implementing the programs that could yield the best test results.

Osborne, Alan R., and Crosswhite, F. Joe, "Forces and Issues Related to Curriculum and Instruction," pp. 155-196, in A History of Mathematics Education in the United States and Canada, National Council of Teachers of Mathematics, Washington, D.C., 1970, 557 pp.

Today's mathematics education faces issues much like those of the 1890's. In the 1890's issues were treated for the first time as important to the nation as a whole. School systems were well enough established to concern themselves with questions of effectiveness and concerns for the future of the nation, rather than merely fighting for existence. Dissatisfaction with the state of secondary education reached a peak in 1890, leading to the establishment of the Committee of Ten. Its studies opened the way for subsequent modifications of the theory of mental discipline.

Osen, Lynn M., Women in Mathematics, The MIT Press, Cambridge, Massachusetts, and London, England, 1974, 184 pp.

Many women made significant contributions to mathematics in the past few decades. Unfortunately, this had not improved the prospects of equality for women in mathematics or mathematics-related fields. Even though the number of women in these fields increased, the ratio of men to women trained increased significantly. In fact, the status of women in mathematics had steadily declined since the early part of the twentieth century. Much concern was expressed about the waste of intellectual potential that women possessed. Not only did women find it difficult to enter these fields, but many women never became trained because of psychological blocks. That such blocks existed was verified by the National Academy of Science's Committee on Support of Research in Mathematical Sciences.

Robinson, Bryan E., "Male Early Childhood Teachers: Changing Views," The Education Digest XLVII:12-14, November, 1981.

Male teachers in the first five grades of elementary were not considered appropriate as recently as the 1950's. The 1980's brought a shift in this sentiment, but the advocates of this change came from two opposing camps: the traditionalists saw it as a means of reinforcing traditional sex role norms, and non-traditionalists saw it as a means of breaking them down and achieving an androgynous balance in roles. Robinson felt that emphasis on androgynous balance provided greater possibility for psychological health to be nurtured in students, and allowed teachers to perform their duties more naturally without a preoccupation on restrictive stereotypes. Whether the present trend of more male teachers in the early grades would support traditionalist views or non-traditionalist, was yet to be seen, but the writer was confident that time would show that the effect was androgynous rather than one of polarizing sex roles.

Rowan, Carl T., "Lip Service for Education," South Bend Tribune, September 21, 1982, p. 10.

Rowan, quoting statistics from the most recent Gallup Pole, reported that eighty-four percent of the American people felt that the best guarantee for a strong America of the future rested on "developing the best educational system in the world" while only half that number felt that it rested on "building the strongest military force". The national policies and programs were boosting the military. Rowan ended on the encouraging note that Congress finally gave evidence of heeding the public consensus in overriding the presidential veto on the issue of allocating money to education, but noted Reagan's warning of continued resistance.

Whitaker, Donald R., "Mathematical Problem-Solving Performance as Related to Student and Teacher Attitudes," School Science and Mathematics LXXXII:217-223, March, 1982.

Basing this study on the conjecture that a student's attitude toward mathematics was a composite of all aspects of mathematics, but could be studied by focusing on one particular aspect, Whitaker chose the area of problem-solving. In this attitudinal research, Whitaker chose three instruments: Mathematical Problem-Solving Test, Student Mathematical Problem-Solving Attitude Scale, and Teacher mathematical Problem-Solving Attitude Scale. Two groups were used: fourth-grade students and their teachers. The student sample demonstrated favorable attitudes toward problem-solving, and all teachers in the sample indicated favorable attitudes toward problem-solving, thus indicating a correlation between the attitudes of teachers and students. The actual performance of the students indicated positive results for single-step problem-solving, and somewhat less positive results on multi-step problem solving, indicating possibly that more time needed to be spent in the classroom practicing problems that involved more thought and planning.

Yager, Robert E., "From the President," NSTA Report, September, 1982, p.1.

NSTA president Yager informed readers of the reassessment of science teaching standards taking place. Yager noted a shift in public attitude toward science education from overwhelming support in the 1950's and 1960's to one of deemphasis now. Our educational system failed to produce a "scientifically literate citizenry", in Yager's words, and the serious predicament had to be addressed. NSTA was reviewing programs which had been effective in the interests of sharing this information with the public in an effort to generate renewed enthusism for science education. The NSTA theme for 1982 was "Focus on Excellence".

GLOBAL IMPLICATIONS

Anderson, Kenneth E., "Last in the World Race?," The Science Teacher, 49: 47-48, April, 1982.

How to maintain the momentum that the post-Sputnik er brought to the fields of mathematics and science was the problem addressed in this article. The renaissance was beginning to fade, yet perhaps some measures could be taken to reverse the trend so that once again students would elect to take courses which demanded a good deal of rigor. The writer, to this end, enumerated some principles that could be employed to keep the field attractive to students and prospective teachers. The exercise of learning a foreign language, adopting curricula "big-idea" oriented, teaching toward memory retention, and finding incentives for students to learn, were the four basic principles suggested by Anderson.

Becker, Jerry P., "1979 National Middle School Mathematics Olympiads in the People's Republic of China," The Mathematics Teacher 75:161-168, February, 1982.

Becker described briefly the uses China made of the Mathematics Olympiads and similar contests: primarily they were used in the selection process that decided which students were most promising and most likely to profit from further education. In selecting problems for the olympiad, the National Middle School Mathematics Contest Committee tried to be consistent with the educational policy: to facilitate quality education, to construct the Four Modernizations, to advance socialism, to aid in the selection of superior youth. The contest committee therefore acquainted itself with contemporary teaching practices, finding that teaching in China, though making a comeback, had suffered under the Gang of Four. It was found that many teachers were preoccupied with impractical contemporary societal problems, taking time away from learning and teaching. Before final selection of contest problems, the contest committee reviewed local contest problems. The Chinese were pleased with the contest results not only for its use in identifying talent but also it pinpointed areas where teaching could be improved, and helped in setting guidelines for a strategy in establishing and promoting techniques that could narrow the gap between Chinese student performance level and the international standard.

Cogan, John J., "Education and Development in the Third World," Educational Leadership 39:430-432, March, 1982.

Rather than waiting until we were embroiled in political conflict with third world countries, Cogan urged that we involve ourselves in knowledge of, and contributions to, the curricula of those countries. Iran, Nicaragua, and El Salvador were cited as examples of situations that might have been tempered through such involvement and communication. Cogan implied that mere political and diplomatic contact with such countries was not adequate. Two models were discussed in detail: Cuba and Jamaica. Both of these focused on the importance of developing quality rural schools. Cogan emphasized the need for the United States to structure its teacher-training programs to stress the importance of global relationships. Noted was the statistic found on a recent survey of college students that indicated that education majors had the least awareness of the global implications of education in the United States. In the writer's opinion, the present direction toward an "information age" supplied a golden opportunity for educators from all over the globe to develop a truly "universal" education.

Golden, Lester, "School Program Emphasizes Global Interdependence," NASSP Bulletin 66:116-118, April, 1982.

Golden, noting that even though global interdependence increased, studies showed that American Students passed through our educational system without gaining the ability to communicate in a second language nor to understand other cultures. The implications of this state of affairs affected the "jobs" issue facing present-day students in that it barred students from entering jobs such as international business, trade, and foreign services, to say nothing of the effect such attitudes had upon the security and well-being of the entire globe. Assistant Principal Golden described the program that Curtis High School, Staten Island, New York, had implemented in order to address this deficiency. Total cultural immersion in language study, field experience, and lectures by visiting speakers were part of this intensive program. Incorporating global issues into every discipline where possible was also considered essential in this awareness training program. All students were involved in the program, not just those choosing to major in foreign languages.

Henchley, Norman, "The Future of Canadian Education," The Education Digest XLVIII:65-68, September, 1982.

Competition for public resources, rising energy costs, turbulance in world politics, shrinking school enrollments, and school closures were among the issues discussed in this article as ones which were relevant to considering the future of Canadian education. Henchley reflected that a preoccupation with these concerns would demand a reorganization of Canadian education at every level, and could possibly lead to regulation and rigidity as a result of tighter resources and the need to justify every expenditure. Quoting British economist, James Robertson, Henchley listed six roles for those seeking to transform the present crisis situation into a "sane, humanistic, ecological society: encouraging interactive life-style, encouraging self-reliance rather than dependence, diffusing power to arouse a sense of responsibility in all, creating new visions of a more realistic life-style, defining strategy, and getting rid of the prevalent business-as-usual attitude.

"Improving America's Foreign Language Competence," Today's Education 69:72-73, September/October, 1980.

This article, an adaptation from the 1979 President's Commission on Foreign Languages and International Studies, was a call to the American school system to realize that our incompetence in foreign languages was posing a real threat to our competence in diplomacy and foreign trade. Many Americans, the Commission found, were infected with the fatuous and arrogant notion that the pursuit of foreign languages was irrelevant. Nothing was further from the truth, it continued. Understanding other cultures, the relativity of values, and the differences among members of the human society were reasons enough to pursue the knowledge of foreign languages. To learn a foreign language was to render it a familiar language, pointed out the Commision.

Lewis , John L., "International Organization for Teaching Physics," The Physics Teacher 18:268-271, April, 1980.

Lewis, recounting his experience of new vitality in his physics teaching that resulted from exchange of ideas with physics teachers from other countries, challenged American physics teachers to acquaint themselves with other approaches to teaching physics. To this end, Lewis enumerated the main international organizations in existence under the parent organization ICSU, International Council of Science Unions, complete with descriptions of services and functions. Lewis stressed that the purposes of these organizations were global in drawing physics teachers together from all over the world, and enriching their teaching techniques. Likewise, they were a means of drawing teachers from developing countries into the circle of physics teachers. Lewis clarified that the interchanges taking place in these organizations were at the educational level, not at the level of scientific research - for reasons of national security.

MacNow, Glen, "Science Education is Taking a Beating," Detroit Free Press, October 11, 1981, p. 1B.

MacNow, quoting the disturbing statistics that fifty times as many Russians took calculus in high school as Americans, Japan graduated five times as many engineers as the United States did, and in France and Germany teenagers were required to study chemistry, physics, and earth sciences through high school, while the United States figures showed that only forty percent had taken a chemistry course, and fewer than twenty percent had taken a physics course, reflected that this could mean that we were not only losing the race for excellence in science education, but were also taking second-rate status in world technology.

Morimoto, Takiko, "Contrasting Attitudes of Japanese and American Teachers," Educational Leadership 39:414-415, March, 1982.

Roles of teachers in three settings, classroom, school as a workplace, and the social setting of the community, were the topics of a questionaire distributed to a group of Los Angeles teachers and to a group of Japanese teachers. Morimoto contrasted the responses of these two groups, finding that in general, Japanese teachers exhibited more dedication to their teaching than American teachers. Stronger committment to service, closer identity with school, sacrifice to social order, and greater personal satisfaction in teaching were the significant attitudes shown in the Japanese responses. American teachers on the other hand viewed themselves as more independent, viewed teaching as a job rather than a life committment, and did not experience much personal satisfaction. Morimoto noted that these findings were consistent with those of similar studies carried out with groups of industrial workers: Japanese workers tended to have a closer identity with their companies.

Popkewitz, Thomas S., and Tabachnick, B. Robert, "Themes in Current Soviet Curriculum Reform," Educational Leadership 39:420-424, March, 1982.

The writers noted that Russian educational philosophy was based upon dialectical materialism and belief in the existence of "law-like" principles of teaching and learning. Geared toward the development of collective rather than individualistic attitudes and behaviors, Soviet education sought to instill in its youth, through academic and extracurricular activities, "proper" attitudes toward the state. Soviet educators viewed themselves as "upbringers". They maintained an inexhaustible optimism regarding the success of their approaches. The writers noted that to a certain degree, Russian education like American education, had its share of unexpected outcomes and contradictions, but a study of their educational programs and goald could explain much about Soviet society.

Purves, Alan C., and Travers, Kenneth J., "Interational Evaluation and American Curriculum," Educational Leadership 39:440-446, March, 1982.

Reporting the findings of the first two studies of the International Association for the Evaluation of Educational Achievement, the writers alleged that such studies were valuable not only for assessing how well our students were doing, but also for broadening our vision in curriculum planning. Viewing education from an international perspective, the IEA compared students in mathematics science, language arts, and early childhood education. Since different countries had a variety of curricula in mathematics, the second assessment study focused on those differences in an effort to identify those that had particular strengths. By examining the curricula and classroom techniques in those countries where such strengths existed, universal educational improvement might be implemented. Two study groups were examined: the equivalents of our eighth and twelfth grade levels. The writers felt that the two IEA studies had been useful in upgrading our curricula in the areas studied.

Schiller, Diane Profita, and Walverg, Herbert J., "Japan A Learning Society," The Education Digest XLVIII:66-68, October, 1982.

Japan ranked number one in mastery of foreign languages in high school and college, in test scores in mathematics and science (United States ranked fifteenth), and managed to recognize that the focus of the post-industrial society was information-processing in nature, and thus the writers felt it possible that Tokyo was likely to become the world information center. The writers examined the education system of a country capable of these successes, highlighting the Japanese capability of developing high powers of concentration in their students and in their ability to convince their young people that success comes only through hard work. Ability, in the Japanese view, was alterable, and disciplined study habits were far more significant in achievement than innate ability. Role models in family life complimented those ideals emphasized in school: adults continued to absorb new areas of knowledge, and the entire family unit was willing to invest large portions of its income to furthering the education of its children. The writers also noted that 85 percent of classtime was devoted to constructive education compared to 25 percent in the U.S. classroom; that 240 days per year were set aside for school in Japan, while only 180 days were for that purpose in the United States. Teachers were considered mentors and their out-of-school hours were made available to students. Teachers considered it their responsibility to motivate students to learn. The school system was based upon a detailed nationwide curriculum which was foundational to the intensive teacher-training programs. Little variation in curriculum was allowed for. The best time to learn to read, according to Japanese educators, was age four. Strong emphasis was placed on self-discipline, standards of acceptable behavior, and values, all taught mainly through anecdotes of great figures of history.

Schwartz, Elaine B., "China - Summer 1981," Educational Leadership 39:429, March, 1982.

Participating in a China study tour sponsored by Phi Delta Kappa and Kent State University's Center for the Study of Socialist Education, Schwartz recounted her impressions of a nation of people eager for education and learning. Many students whose education had been interrupted by the Cultural Revolution, continued their education independently. During this era, unqualified students passed through the system of education without achieving. Following that time, under the "four modernizations", China required students to pass examination before promotion to the next level. For those who did not pass the examinations, technical programs were developed. The writer was impressed by the energy and vitality exhibited by the Chinese people in their efforts to build a strong nation, and to make up for the apparent setbacks they had experienced through political changes.

Smith, John P., "Education in China," Educational Leadership 39:426-428, March, 1982.

Smith quoted statistics which showed the tremendous increase in the number of students attending schools and universities in China. The writer noted the difficulty encountered in China to meet the needs of increased numbers of students were similar to those in the United States: lack of leadership, poor training for teachers, misbehavior of students, and excessive paperwork. The problem of slow learners was addressed by a detailed program when it was discovered that such students could be used to advantage in reaching some of the goals of the "four modernizations" as trained workers. The most critical problem at university level was lack of adequately trained personnel. Smith concluded that some problems of education existed in all educational systems regardless of the size of the nation, its stage of development, or its form of government.

Starr, Frederick S., "International High Schools," The Education Digest XLV:14-16, November, 1979.

Starr advocated that one way to cope with American lingual isolationism was to establish International High Schools in big city school systems. In addition to teaching all the courses mandated by state laws, these schools would place emphasis on mastering at least one language besides English, and getting firmly into at least one more. Different areas of the country would determine what the main language should be depending upon the principle ethnic make up of the population. Starr claimed that such schools did not necessarily require more funding, did not tend to become elitist, and gave a wider base to work from in terms of career choices for the students especially with industries doing business abroad.

Swetz, Frank J., "Teaching Physics in China," The Physics Teacher 18:362-366, May, 1980.

Swetz, interested in the impact of society upon scientific thought and teaching, examined the status of Chinese education relative to its goals of modernization. Desire for rapid modernization and industrialization motivated the Chinese to upgrade their physics curriculum. Critical to the success of the program was finding the balance between theory and practical applications relavant to Chinese life. Swetz pointed out that Chinese education was revolutionary rather than evolutionary, and that its reforms in the teaching of physics were in response to the new government's call to achieve the "four modernizations" by the year 2000.

"U.S. Watchdog Role Over Russia 'Slipping'," South Bend Tribune, September 23, 1982, p. 18.

Senator Richard G. Lugar of Indiana, chairman of the Senate Foreign Relations Committee's European affairs subcommittee, noted that "the Soviets have more than 7,400 American specialists within a network of 12 key Moscow research institutions, but here in the United States, nearly half of the recognized academic experts working on Soviet affairs will be dead or retired by the end of the 1980's, and there are few new students to replace them ... The hard truth is that our national capacity to analyze the views and actions of our primary adversary in the world is seriously eroding." Lugar felt that one of the primary reasons for this trend was the fact that decreased public and private funding had turned the most capable students into other more promising careers. (See below: Bill S.2919)

Bill S. 2919, 97th Cong., 2nd Sess., September 16, 1982

The name of the act was to be: "Soviet-Bloc Research and Training Act of 1982". The bill was presented by Senator Lugar and Senator Biden to the Committees on Foreign Relations and Labor and Human Resources. The expressed purposes of the bill were: "To help ensure the Nation's independent factual knowledge of Soviet-bloc countries, to help maintain the national capability for advanced research and training on which that knowledge depends, and to provide partial financial support for national programs to serve both purposes".

Zisenwine, David, "American Curriculum Abroad," Educational Leadership 39:416-419, March, 1982.

Zisenwine urged Americans to be aware of the impact of American educational theories and trends upon the educational systems of other countries. The writer presented specific information regarding American impact upon Israel. Many educators did their graduate studies in the United States. One such educator, the founding director of the Center of Curriculum Development in Israel, Shevach Eden, studied under Tyler and Bloom at the University of Chicago. When he returned to Israel, he set out to implement their theories. As trends in the United States moved from classical models toward learner-needs models and those addressing society needs, so did Israel. As a result, three projects, among others, were initiated: MATAL encompassing grades 1 through 8, NETA addressing secondary school curriculum, and Perach initiating a peer-tutoring project in mathematics. Ironically, the idealistic theories developed in the United States were practiced in a purer form in Israel than they ever were in the United States, said Zisenwine.

SPECIFIC PROGRAMS

Benson, Bernard W., "Refreshing the Teaching Spirit," The Science Teacher 49:39-41, September, 1982.

Benson suggested two alternatives for science teacher in-service training as a means of circumventing the problems of less funding from the federal government. The first suggestion was to search for private funding. The second suggestion was to invent new approaches to in-service programs. One such program was developed by the Center for Enviromental/Energy Education at University of Tennessee at Chattanooga. This consisted of a minicourse series offering a self-renewal for teachers desiring to upgrade the quality of teaching as well as to help teachers to stay "current". Each minicourse consisted of a three-part "Learning Cycle": exploration, invention, and application. Teachers could enroll in up to six minicourses, each minicourse earned one hour of credit. They were designed to be compatable with in-service programs sponsored by the individual school programs. In this context, they offered a workable substitute for federally funded programs and could benefit the entire school system.

Bohning, James J., "Remedial Mathematics for the Introductory Chemistry Course: The 'Chem 99' Concept," Journal of Chemical Education 59: 207-208, March, 1982.

Bohning was concerned about the wide range of differences that was apparent in the mathematics preparation of chemistry students in a typical freshman chemistry class in colleges. The writer described what Wilkes College did to alleviate the problem. One week prior to the beginning of the fall semester, a basic mathematics test was sent to students to help them evaluate their own readiness for beginning chemistry. A percentage basis was spelled out so that the student could decide whether remedial work was required. For those needing remedial help, the college offered a non-credit course called "Chem 99", an intensive review of all the topics covered on the self-test. Positive reactions on the part of the students who had participated in this program encouraged the continuance of the procedure.

Clarke, Gertrude M., "Teaching Physics at Chatham High School," The Physics Teacher 18:352-357, May, 1980.

Clarke, recipient of the 1978 Princeton Prize for Distinguished Secondary School Teaching in New Jersey, described what she considered her most successful methods for teaching physics. Her general approach consisted of emphasis on experimentation reinforced by theory. Her self-designed Nucleonics course received positive response from students and from the colleges which they attended. An interesting note was that when her students did not perform as well as Clarke had hoped on the Advanced Placement chemistry test, she was advised by a reader of A.P. chemistry essays to increase topical coverage by getting a college-level text, by getting a double laboratory period (not for experiments but for more lecture time), by reducing or eliminating student experimentation, and by eliminating or minimizing class demonstrations. In opposition to these recommendations, Clarke maintained that the key to successful science training was accomplished through balancing experience with theory.

Donnelly, Harrison, "Students' Declining Science and Math Ability May Lead to New Federal Program," South Bend Tribune, December 19, 1982, P.21.

Programs to restore technical education in mathematics and science to the level of prominence it had in the post-Sputnik years, was tied up in House legislation, reported Donnelly. Poor facilities, declining student and public interest in these fields, the drain of qualified personnel to industry, and the declining test scores alarmed the writer. The Scientific Manpower Commission claimed that only 20 percent of the needed computer-science personnel at doctorate level were being trained. The House controversy lay in the fact that the House Science Committee wanted to fund grants to applied science and to universities willing to investigate ways of improving science teaching in elementary and secondary levels through NSF, while the House Education Committee wanted to direct its support teachers directly through the education department.

Ernest, John, Mathematics and Sex, Triple R Press, Goleta, CA, 1976, 30 pp.

In an effort to reverse the trend of filtering women out of mathematics-related fields, Ernest reported that IBM funded a Mathematics Association of American proposal "for a secondary school lectureship program designed to interest more women in mathematics". The rudiments of this program were to interest girls in studying mathematics, and to impress upon school guidance departments the importance of encourageing girls to take the foundational mathematics courses needed for mathematics-related careers. Positive role-modeling was considered an important thrust of this program.

The Experiment in International Living (EIL) and The School for International Training (SIT). (See Appendix E)

EIL and SIT have been associated with the Peace Corps for 20 years, and were recommended to those who wished to have a share in participating in "Third World development and improving United States' understanding of the Third World".

"Global Education Grants," The Education Digest XLVIII:75-76, October, 1982.

This news brief updated recent developments regarding NAESP's Global Education Project, citing the fact that the project had donated $11,000 in awards in an effort to teach elementary students to begin to understand the extent to which countries depend upon one another for the necessities of life and for understanding and communication. H. Thomas Collins, consultant to the NAESP project pointed out that the grants were in response to "the inescapable fact that we live in an era of global interdependence". Collins pointed out that waiting to teach these concepts until high school was wasting the best years for getting these ideals ingrained in young minds. Schools receiving the grants were located in 13 states and in one Canadian province.

Hoosier Association of Science Teachers, Inc., "In Pursuit of Excellence in Science Education," Indianapolis, Indiana, February 11-12, 1983.

This thirteenth annual convention of the Hoosier Association of Science Teachers, Inc. (HASTI) featured excellence in science education. Three topics recurring through this research were keynoted at this convention: "Soviet Force versus U.S. Force", "A Crisis in Science and Mathematics Education", and "Precollege Mathematics and Science Education: Is There a Crisis in Indiana?".

Kapucinski, B. Phyllis, "The Purpose of Laboratory Instruction in High School Chemistry," The Education Digest XLVIII:53-55, September, 1981.

In this historical survey of laboratory instruction, Kapuscinski traced the influences that had been instrumental in not only whether laboratory instruction was worthwhile but also in the selection of special emphases that instruction should address. Initially, laboratory instruction was seen as a means of establishing disciplined habits of study, thus having carry-over to other disciplines. Social and economic conditions influenced chemistry education from 1900 to 1939, shifting from inorganic emphasis on practical considerations such as health, agriculture, and cooking. Laboratory instruction suffered during this period. 1951 brought new respect for this type of instruction: the belief that it could provide a strong foundation for military and civilian needs in a technological society was widely held. Kapuscinski felt that following this era, a transition occurred that shifted our educational goals to meet the needs of a post-industrial society: career, energy, environment, urban problems, and similar issues that along with global problems, necessitated moral clarification of values. "The education of the future should not be considered merely in terms of reform of curriculum, not of the school, but of man's capacity for creating a culture, society, and technology that not only feed him but keep him caring and belonging".

Klausmeier, Herbert J., "A Research Strategy for Educational Improvement," The Education Digest XLVIII:19-22, September, 1982.

Klausmeier described the team effort between researchers from the Wisconsin Research and Development Center for Individualized Schooling (University of Wisconsin) and the staffs of two middle schools, one junior high school and two senior high schools for the purpose of improvement of the educational performances of the students. The study was longitudinal. The findings of the experiment indicated that positive outcomes occurred when definite plans and goals were set, specific tasks were outlined, and measurement devices were pre-determined. The role of the researcher was described as that of consultant rather than director. The chief implementers were the teachers themselves, and the goal was that as time went on each school would become more autonomous in carrying out its own improvement program. The writer concluded by recommending that more of this type of interactive research could be carried our with very little outside funding and required only a few hours per week on the part of the researcher, based as it was on a consultancy basis.

Muessig, Raymond H. and Gilliom, M. Eugene, "Perpectives of Global Education: A Sourcebook of Classroom Teachers," Eric Document, 80 pp., 1981, ED207 857.

The researchers collected works to compile this sourcebook, to be used to help teachers to integrate global perspectives into their classroom procedures. Global perspective was necessary for survival and the collective well-being of world citizens. It was the responsibility of professional educators to help their students to have a comprehensive view of the world, as well as to help them see holistic relationships. Americans tended to think of civilization as American or western, and arrogantly or ignorantly assumed that the world must master English in order to be civilized. Misunderstanding, ignorance, and lack of communication brought us to the brink of catastrophe time and again: the Cold War, Iran, El Salvador, Poland, to mention a few. The numbers of our negotiators who spoke the languages of these countries were appallingly low. "Interaction" and "interdependence" were words that should be stressed in the training of our young people; emphasis should be placed on an understanding of science as a process for understanding ourselves and a means to betterment of our life on earth.

"New Projects," The Mathematics Teacher 74:570-571, October, 1981.

"Project Advance" was described as a cooperative program in the state of New York between Syracuse University and some eighty high schools in the state. It allowed students to take college level courses taught by teachers, at their own high schools. The teachers were carefully screened by the university, were required to take seminars and training courses, and were allowed to count their assignment to a Project Advance course as equivalent to two high school courses.

"NSTA will 'Focus on Excellence' in Dalles," NSTA Report , January, 1983, p.1.

The conference theme for the 1983 National NSTA Convention in Dallas, Texas, was "Focus on Excellence". Cecily Cannon Selby, Co-Chairperson of the National Science Board Commission on Precollege Education in Mathemamatics, Science, and Technology was slated to report; Willard J. Jacobson, Teachers College, Columbia University, was to speak on "Science Teaching in the U.S. An International Perspective"; Steven Weinberg, Nobel Laureate for Physics in 1979, was to speak on "The Origin of the Universe"; and Linus Pauling, Nobel Laureate for Chemistry in 1954 and for Peace in 1962, was scheduled to address "Excellence in the Teaching of Elementary Chemistry." Along with these notable speakers, the convention scheduled 156 science-teaching workshops selected for excellence.

Renner, John W., "Priorities for Research in Science Education: A Survey," Eric Document, 21 pp., 1981, ED 207 855.

Asked to list specific priorities for research in science education, 101 members of the National Association for Research in Science Teaching (NARST) responded with 398 statements. Renner and his collegues organized the responses into general categories including: teacher education, curriculum, learner, classroom, and research. From the responses, twelve specific tasks formed a beginning framework for research. A major responsibility of any profession was to identify research needs. One interesting finding of this survey was the fact that relatively few respondents felt that research on laboratories and laboratory equipment were a concern. The writer felt that this might be an indication that the efforts and funding of the 1960's and 1970's was so successful that the need did not exist, or it could mean that laboratory training was not being emphasized or that it was being ignored. If the latter were true, the writer hypothesized that science was headed in an undesirable direction.

Saperstein, Alvin M., "Why Study Physics?," The Physics Teacher 18:456-457, September, 1980.

Decision-making citizens of a technological society "must have some insight into the possibilities and limitations of modern technology", in Saperstein's opinion. Developing minds that can think through problems requiring conceptual understanding of the laws of thermodynamics and the fundamental ideas of physics could not be achieved through the teaching of "single-concept" physics courses, according to Saperstein. "Multi-concept" teaching and a voluntary adherence to national standards such as those required in physics majors courses in the Graduate Record Examinations were recommended by the writer as a means of avoiding the trend toward mediocrity in the field of physics.

Scannell, Dale P., and Guenther, John E., "A Five-Year Program for Teacher Education," The Education Digest XLVIII:10-12, September, 1981.

The writers reported that the University of Kansas School of Education adopted a program of 160 credit hours, equivalent to five years, implemented in the fall of 1981. The decision to do this was based on the findings of a study group at the university whose goal it was to upgrade the quality of teacher education. The group identified the qualities that every teacher should possess before entering the classroom: self-understanding, knowledge of human development, skill in human relations, knowledge of curriculum planning and implementation, skill in choice and implementation of teaching procedures, knowledge of the role of education in the socio-political setting, an understanding of teaching as a profession, skill in assessing student ability, possess a liberal education and have adequate knowledge of at least one subject area included in public school curriculum.

"Scientific Manpower Commission," NSTA Report, September, 1982.

Both NSTA and NSTM were invited to become members of the Scientific Manpower Commission, the first time these educational organizations were represented on the Commission. Advantages in this were far-reaching since it gave the educational community an active voice in recruitment, training, and utilization of science personnel. It also provided the opportunity for education organizations to have direct contact with government and private sectors.

Wallace, Charles W., "Dissemination Strategies at the National Science Foundation in Pre-College Education," Eric Document, 8 pp, April, 1981, ED 207 857.

Wallace in this presentation to the American Educational Research Association, reviewed NSF's institute programs since the founding of NSF in the 1950's, and described current activities of the Information Dissemination for Science program. Emphasis was placed on betterment of teachers, curriculum, and facilities. In 1977, NSF sponsored the Pre-College Teacher Development program, a program of summer institutes and workshops for secondary as well as elementary school teachers providing instruction in curriculum use of instructional materials and new technologies in science and mathematics. Its goal was to expand the knowledge base of teachers in these subjects. Wallace stated that the Information Dissemination for Science Education program was receiving requests from pressure groups to reorganize to include college level programs. It was hoped that the payoff for these efforts would be overall improvement in American education.

"Westside Story," Time 110:39, December, 1977.

Marva Collins did not need expensive audio-visual equipment to raise the achievement level of students classified as mentally retarded, and those who were chronic underachievers. Drilling and intensive concentration were the hallmarks of Collins' strategy of teaching. Emphasis upon the precepts of the classics such as Socrates' "The uneducated man is like a leaf blown from here to there, believing whatever he is told", and Marcus Aurelius' "He alone is poor who does not believe in himself" were chanted by the class so frequently that the students knew them by heart.

Yager, Robert E., "Message from the President," NSTA Report, January, 1983, p. 1.

NSTA's Search for Excellence in Science Education (SESE) took on new importance when support for the program was given from the NSF National Science Board's Commission on Pre-College Education in Mathematics, Science, and Technology and the National Diffusion Network. The Commission planned to use the findings of SESE to set up an agenda for improving mathematics and science education.

Yager, Robert E., "Editor's Corner," The Science Teacher 49:10, September, 1982.

Reporting the findings and recommendations of Project Synthesis, a 1977 NSF research project designed to assess the status of U.S. science education, Yager recapped the seven most important priorities for action for the remainder of this century in science education:

1) Re-definition of goals
2) A new concept of curriculum
3) Improvement of teacher preparation
4) New materials developed
5) Incorporating new research into teaching
6) Attention given to evaluation in science education
7) Support for exemplary teaching

ISSUES CONFRONTING SECONDARY SCHOOLS IN THE 1980's

Koerner, Thomas F., and Bruce, Carol, "Determining the Priorities of American Secondary Education, A Consideration of the State of American Secondary School," NASSP Bulletin 66:1-74, April, 1982.

In an effort to identify priorities and to articulate the main issues confronting secondary schools in the 1980's, the editors of the Bulletin sponsored a conference at the College of St. Thomas in St. Paul, Minnesota. Along with Education Secretary, Terrel H. Bell, several people were asked to make presentations, and others were asked to make responses to these presentations. Among other issues, these speakers were asked to address the problems of fiscal constraints, school closings, declining test scores, declining test scores, declining interest in foreign language, loss of qualified mathematics and science teachers, etc. The following are statements, either quoted or paraphrased, which represent the sentiments of the speaker regarding the specific problems of this research.

The presentations were organized according to the three perspectives: national, local, and state. The following statements are arranged in the order of presentation.

FROM THE NATIONAL PERSPECTIVE

Bell, Terrel H., "From the National Perspective," NASSP Bulletin 66:3-6, April, 1982.

Terrel H. Bell: Secretary of the U.S. Department of Education, Washington, D.C.

One problem facing secondary schools in the 1980's was the fact that talented personnel were being drawn to other careers. Talented women, previously barred from other male-dominated careers, were now finding it easier to enter those fields instead of education as a result of the women's movement. A better personnel system, up-grading school programs, and providing competitive salaries were recommended by Bell as necessary enhancements to educational careers in teaching and administration. Concern was expressed by Bell regarding trends away from mathematics, sciences, and foreign languages, fields which were extremely important to the United States of the 1980's as it faced expanding international commerse and trade.

Thomson, Scott D., "From the National Perspective," NASSP Bulletin 66:7-19, April, 1982.

Scott D. Thomson: Executive director of the National Association of Secondary School Principals, Reston, Virginia.

"The diploma must be better tomorrow than it is today or the United States can no longer lay claim to being the best educated nation in the world."

"The level of mathematics study currently required for diploma is a national disgrace - the United States is far behind all other technological societies in the amount of mathematics required of its high school students."

Thomson felt that the challenge of the 1980's was to recognize the new role schools must play in the information age, and to convince the public to obtain the resources needed to do the job right. The priority for the 1980's was to emphasize "academic conscience", and develop educational research, giving special attention to curriculum leadership, instruction, relationship between educational and social goals, and the role of education in the information age. From Thomson's perspective, the past three decades in the United States had set goals for its education: the 1960's expected education to improve national defense, the 1970's wanted equity in education, and the 1980's was striving for excellence in education.

Sizer, Theodore R., "From the National Perspective," NASSP Bulletin 66:19-24, April, 1982.

Sizer felt that the priorities of the 1980's fell into two categories: pedagogical and political. The pedagogical priorities involved not only providing better courses and upgrading requirements, but also devoting much energy to providing excellent conditions in which education could take place. The inequities between rich and poor were the basis for Sizer's second category. He stated that our goal must be directed toward achievement of an open and moral society, one that assures any child, regardless of parentage, the access to a decent education.

Nielsen, Lloyd, "From the National Perspective," NASSP Bulletin 66:27, April, 1982.

Lloyd Nielsen: President of the American Association of School Administrators, Arlington, Virginia.

"One of our highest priorities today is developing communication skills ... that today includes the ability to use mathematical symbols and to use the technology of today."

Nielsen felt that emphasis should be placed on partnerships: those between principals and teachers, and those that linked home, school, and the community.

McGuire, Willard, "From the National Perspective," NASSP Bulletin 66:28-31, April, 1982.

Willard McGuire: President of NEA, Washington, D.C.

"Education, both public and private, has certainly been the most successful social enterprise this nation has had in its two-hundred-year history."

McGuire noted that while money could not solve all the problems facing U.S. education today, its shortage certainly intensified them. Reporting some of the findings of the second NEA study, he pointed out that excellence in education had much to do with funding and student-teacher ratios.

"It seems to me that national security is part of education all the way along the line."

FROM THE LOCAL PERSPECTIVE

Reed, Vincent, "From the Local Perspective," NASSP Bulletin 66:33-37, April, 1982.

Vincent Reed: Assistant Secretary for Elementary and Secondary Education, U.S. Department of Education.

The chief issue facing education in the 1980's was cutting back in order to meet financial committments. Reed felt that the primary question that should be addressed in deciding which programs to cut was whether the program existed for political reasons or for educational ones.

"It's a criminal violation to take twelve years of our younsters' lives and turn them out into the world unable to get a job because they can't read."

"We need to expect them to learn."

Frye, David, "From the Local Perspective," NASSP Bulletin 66:37-43, April, 1982.

David Frye: Principal of Johnson Senior High School, St. Paul, Minnisota.

Public confidence, conservative trends in community and student sentiments, financial constraints, staff unrest, and morale problems were enumerated as the chief problems facing education in the 1980's. Frye felt that these problems should be addressed as priorities along with a recommittment to teaching as a life profession and the reestablishment of pride in work well done.

"I think that we've come to a time when it's the responsibility of the school to inform colleges and universities what we need as opposed to their sending us what they think we need."

"Secondary schools are preparatory institutions ... I don't believe we're in a position to be a terminal educational facility where kids come out of our schools and go on to employment and remain there for the rest of their lives."

Regarding the 1960's and 1970's: "... allowing people to do what they perceived as being relevant ... (is) coming back to haunt us now."

"As professionals we must plan for the future, not react to it."

Banas, Casey, "From the Local Perspective," NASSP Bulletin 66:43-48, April, 1982.

Casey Banas: Education Editor for Chicago Tribune.

Charged with the mission to run a series on the ten most excellent schools in Chicago, Banas found twenty that merited his attention. Serving different communities with diverse needs, these schools shared one attribute: that of serving well the unique needs of the community. They also either had or demanded to have, a considerable degree of autonomy. The twenty schools did not represent equal opportunity, they differed widely in emphasis, course offerings, and methods of teaching. They also differed widely on methods of handling discipline problems. Banas concluded by stating that the challenge of the 1980's was to find ways of extending the excellence of these schools to those that were contributing to the problems of increased learner deficiencies.

Nickerson, Neal, "From the Local Perspective," NASSP Bulletin 66:50-52, April 1982.

Neal Nickerson: Professor of Education at the University of Minnesota; president of the Midwest Council of Educational Administration.

"We know ther are no effective schools without effective principals."

Permuth, Steve, "From the Local Perspective," NASSP Bulletin 66:52-53, April, 1982.

Steve Permuth: Dean of Education at Bradley University, Peoria, Illinois.

Permuth suggested that one way to retain quality personnel in teaching, especially in the fields of mathematics and science, would be to look for ways to get industry to subsidize those fields.

FROM THE STATE PERSPECTIVE

Smith, George, "From the State Perspective," NASSP Bulletin 66:56-60, April, 1982.

George Smith: President, Arizona State Board of Education, superintendent of Mesa, Arizona, Public Schools.

Smith's perpsective on U.S. education was from the vantage point of 33 years as a teacher, principal, and superintendent of schools. "We are doing a better job than most of the public is willing to give us credit for, but we need to do a better job of making the public aware of our successes."

Smith listed quality teaching, retaining talented personnel, and dealing with student discipline as problems requiring attention in the 1980's. "I think a real honest-to goodness marriage between education and the business-industrial community is an absolute necessity for survival."

Campbell, Anne, "From the State Perspective," NASSP Bulletin 66:61-64, April, 1982.

Anne Campbell: Commissioner of Education, State of Nebraska.

Campbell noted that the idea of excellence was a recurring priority throughout American educational history. She stressed that one of the problems of our educational systems was the conflict of desired outcomes demanded by two groups in particular: industry and small business. Industry wanted their future employees to leave high school with a strong background in mathematics and science, preferring to handle specific-skill-training on-the-job. Small businesses, on the other hand wanted students leaving high schools to have specific skills. Campbell also reviewed briefly the emphases of the International Conference on Education which took place in Switzerland. They were: moral and ethical values, controlling the explosion of knowledge in science and technology before it controlled us, and universal education.

Quie, Al, "From the State Perspective," NASSP Bulletin 66:65-68, April, 1982.

Al Quie: Governor, State of Minnesota.

"The best way to understand education is to know that it is a national concern, a state responsibility, and a local function."

Quie pointed to lack-of-skills as the primary concern of the nation, and listed three things that needed to be done: involve the family, involve the community (especially business and industry), and demand good hard work from the students.

SUMMARY AND CONCLUSIONS

According to this research, the teacher situation in the 1980's was at crisis level: Opel stated that the number of mathematics teachers dropped by 78 percent in the 1970's and the number of science teachers dropped by 64 percent in the same period. Williams reported that in North Carolina, 55 percent of the mathematics positions were filled by persons unqualified to teach the subjects. Furthermore it was difficult for a qualified person to unseat an incumbent teacher due to tenure policies. NCTM reported other incidents of this type in other states (see Appendix D). Kilpatrick stated that 42 out of 45 states reported shortages in mathematics and science teachers in 1981. Complicating the teacher situation further were statistics quoted by Frye (1979) that college students entering education careers were among the weakest students, and Kirwan stated that teacher-preparation was weak. Kirwan related that Brown University Professor Lindsay felt that NSF teacher institutes proved in many cases to be too-little-too-late as a means of improving the quality of teaching in mathematics and science.

The impact of the women's movement had its share in altering the shape of education of the 1980's. Alden reported the statistic that a higher proportion of women in science graduated in the 1920's than in any decade since. While recent statistics showed an increase, Armstrong noted that women did not perform as well as men in advanced mathematics and science courses, and Randour et al reported that the women's movement had helped to alter this, but that women still had not achieved parity with men in the fields of mathematics and science. Osen suggested that psychological blocks prevented women from entering mathematics-related fields, Ernest felt that this stemmed from the

stereotyped sex-role-expectations existing in our society and schools, and Robinson felt that this situation might be alleviated by the androgynous effect of male teachers in early education. The women's movement had been instrumental in opening higher-paying jobs for women in industry and higher education, according to Bell, thus providing a drain of talent away from public school teaching.

Industry played an enormous role in shaping the education of the 1980's. Bell and McCormack pointed out that the higher paying jobs had drawn the most talented students, men as well as women, away from public school teaching careers. Golden, Starr, Permuth, and Smith (1982) suggested that while industry was part of the problem, it could help provide a part of the solution by offering incentives to talented men and women to enter careers in education. Not only would education profit from such an arrangement, but so would industry: Lagowski reported that industry spent time and money remediating the inadequate preparation of students coming out of the public education system.

The product of education, the student, did not exhibit the quality desired: Frye (1979) revealed statistics indicating falling SAT scores; Goldhammer reported that students were ill-equipped to participate in further education or employment; Opel said that half of our juniors and seniors took no mathematics at all; and Lin, Jones, Whitaker, Saperstein, and Anderson complained of students grasping for quick-answers and missing the broad concepts. Lin had the added dilemma of students who gave lip-service to an understanding of general concepts but could not demonstrate this in specific problems. Hudson, Lagowski, Opel, Whitesitt, and Bohning gave evidence of science and mathematics in need of remediation before entering college courses.

Terms used to describe students of the 1980's were not complimentary. Willoughby mentioned "math stupidity", Yager (1982) used the term "scientifically illiterate", Golden, Lugar, and Bell worried about incompetence in foreign languages, while Quie felt that lack-of-skills summarized all of these deficiencies.

Falling standards of excellence were the price we were paying, according to Kirwan. Willoughby and Lugar concurred in their judgment that the situation presented endangerment to national defense and the running of the economy.

Comparisons with other countries were varied. Henchley reported that Canada was grappling with many of the same issues as the United States: financial cutbacks, school closings, and the necessity for revamping the curriculum to meet changing needs. Popkewitz noted that even the most structured educational systems such as that of the Soviet Union had their share of unexpected outcomes. Galbraith related a study on Australian teacher trainees who exhibited mathematics deficiencies such as ours. Schwartz (1982), Smith (1982), Becker, and Swetz examined the positive unifying effect provided by the goals of the Four Modernizations in China's push for excellence in education.

Most of the student comparisons seemed to show evidence that the United States was falling behind other world powers: MacNow revealed the statistic that 50 times as many Soviet students took calculus in high school as American students, Japan graduated five times as many engineers, and that France and Germany had stiffer science and mathematics requirements. Schiller examined the success of Japanese education, noting its philosophy that ability is alterable and disciplined study habits were more significant in achievement than innate intelligence. (These assumptions were echoed in Marva Collins' alternative school program in Chicago.) The concept of satori, role-modeling at home, and more school days (240) than in the United States (180), revealed deep committment to education in Japan. Morimoto concluded from his study that Japanese teachers were more available to students. He also found that Japanese teachers were more dedicated, more effective, and more respected than their U.S. counterparts. According to statistics quoted by Kilpatrick, Japan, along with the Soviet Union, were not experiencing the same drops in mathematics and science achievement as the U.S. Kilpatrick felt that the ignorance gap in the United States was a serious national problem.

Hestenes felt that the single most significant influence on science education in the secondary schools was the university professor. The professor was responsible for writing the textbooks, teaching the teachers, and developing the curriculum. Hestenes alleged that is was the lecture-method of science teaching used by university professors that was mimicked by teachers in secondary classrooms across the country. Two conflicting demands on the professor's time were blamed for this situation: the demand to teach and the demand to publish. It was Harvard Professor Holton's opinion that nothing could change the predicament of science education until the scientists became directly involved in writing children's books and textbooks, in teacher-education, and in curriculum development. Frye (1982), on the other hand, felt that schools should start telling universities what secondary schools needed rather than taking what the universities thought they needed.

Goldhammer and Kilpatrick pointed out that the public had the type of schools they demanded and that schools reflected that opinion rather than altered it. Frye (1979), Chavez, Corrigan, and Kirwan concurred in laying the blame on lack of quality in teachers and teaching. Greer, Banas, Nickerson, and Nelson pointed out the fact that the most important influence was administration, even suggesting that no quality schools existed without strong administration. Attitudes of students ranging from general apathy toward education to specific psychological blocks against mathematics and science were significant in sliding performances, according to Swartz, Clark-Meeks, Lin, and Ernest.

Blame for the situation was attributed also to a general tendency toward a weak diploma, according to Thomson, and Sizer said that this was due to undemanding requirements. Kilpatrick, McGuire, Renner, and Kirwan felt that inadequate funding for facilities in science was to blame. Long pointed to societal changes such as family composition and migrations to the sun belt states as further causes for falling standards.

DeVault noted that changes in the psychology of learning had tremendous impact upon the justification for teaching mathematics. Faculty psychology in the 19th century found it useful as mental discipline. At the beginning of the 20th century, Thorndyke and Dewey asserted that all learning must be meaningful and must have relevance to the learner. This situation existed, more or less, until the 1950's when Sputnik convinced us of the utilitarian benefits of maintaining our expertise in mathematics and science. Current research in cognitive psychology in the two areas of information-processing and Piagetian thought were examined by Hestenes as factors significant to the present learning dilemma.

A great diversity of opinion existed regarding the desired outcome of American education. Goldhammer viewed education as the servant of "the American concept of freedom and equality". Kirstein, Lin, Jones, Whitaker, and Anderson spoke in terms of goals of concept-teaching, having "big-idea" oriented curricula, and getting away from quick-answer learning. Quie proposed stressing skills at every level, Thomson's goal was "academic conscience", Cogan and Muessig stressed universal education directed at global necessities of interdependence. Frye (1982) believed that secondary schools could not be expected to produce personnel ready to pursue life careers: they could only be expected to prepare personnel for further education and training. All concurred in their committment to excellence, but it was specifically addressed by Yager, Campbell, and Goldhammer, and it was used as the slogan for NSTA and HASTI conferences in 1982 and 1983 respectively. Kapucinski urged a curriculum reform that would yield an increased capacity in citizens for creating a culture.

Haladyna, Ernest, Clark-Meeks researched attitudes toward mathematics teaching and learning. Klausmeir reported the successful strategy of cooperative efforts between a researcher-consultant and an individual school in upgrading curriculum and quality of teaching. Galbraith and Saperstein made a

study of relational learning versus instrumental learning. Further research was recommended by Corrigan, Hestenes, and Yager in the area of curriculum development. Renner pointed out the importance of identifying research needs and specifically stressed the importance of laboratory education research for science. Osen felt that further research was needed in strategies to break down psychological blocks against mathematics, especially in women. Thus in the area of research, both completed and proposed, two general categories were addressed: teacher-improvement and curriculum-improvement.

Suggestions for teacher-improvement were proposed by Goldhammer, Hestenes, Howard, Wallace, and McCormack: we needed to develop education degrees that teach teachers to teach toward excellence - this included college-level teaching as well; teachers should teach scientifically and be taught thoroughly in the disciplines they were to teach; we needed to pay teachers salaries competitive with those of industry and other professions. It should be noted that not every writer agreed that higher salaries would solve problems of poor quality in teaching: Keisling alleged that higher salaries could not improve existing poor quality. He did however concede that as a short-term means of attracting new qualified personnel, offering higher salaries might be a way of acquiring qualified personnel. Keisling further stated that union contracts needed to be more sensible about lay-off procedures. Seniority basis lay-offs and tenure terms merely kept bad teachers longer.

In conclusion, Harvard Professor Holton stated that determining a curriculum that would turn our system around on a mass scale depended first on intellectual solutions and next on political will: "we must have a national commitment to education second only to national defense and very closely connected with it. Unless educators and parents, and indeed students themselves, can be made to understand the urgency of this mission, of an educated citizenry, all that we do will disappear in the sand anyway".

RECOMMENDATIONS

It is recommended that:

1. Research should be continued in areas of cognitive psychology, attitudinal causal effects, and curriculum rejuvenation - especially in the science fields where micro-computers must play a part.

2. Colleges and universities across the country should, with the cooperation of local school boards:

   a. Initiate consultancy-research projects designed to upgrade curriculum and quality of instruction.
   b. Actively recruit, train, and possibly finance talented university students in the field of teaching.
   c. Actively seek talented teachers on-the-job, and find incentives to keep them in the classroom.

3. Local industries and businesses should, with the cooperation of local school boards:

   a. Initiate programs that would encourage talented university students to enter the field of teaching.
   b. Actively help finance educators and teachers who have demonstrated specific talent and expertise.

4. Teacher education programs should:

   a. Initiate stiffer entrance requirements.
   b. Define strict levels of achievement to be attained before awarding degrees.
   c. See that teachers are thoroughly trained in the disciplines to be taught.

5. Teacher organizations should become involved in teacher excellence by a thorough revamping of tenure requirements, possibly taking an active part in teacher-evaluation.

6. Programs such IEA and IAEWP should be supported to promote international awareness.

7. Administrator requirements should have a broad base of academic preparation in all subject areas.

8. Educational organizations and associations should become involved in political lobbying for the improvement of public education.

9. Parent groups should be actively recruited by school boards to participate where they can in the process of educating their children.

BIBLIOGRAPHY

BIBLIOGRAPHY

Note: Numbers in parentheses indicate page numbers of this research paper.

Akey, Denise S., ed., Encyclopedia of Assoications, Gale Research C., Detroit, Michegan, 1983, 1589 pp. (9, 11, 12, 13)

Alden, Elaine F. and Seiferth, Berniece B., "Women in Science and Technology," The High School Journal 64:322-325, May, 1981. (14, 53)

Anderson, Kenneth E., "Last in the World Race?," The Science Teacher 49:47-48, April, 1982. (32, 54, 57)

Armstrong, Jane M., "Achievement and Participation of Women in Mathematics," The Education Digest XLVII:40-43, April, 1982. (14, 53)

Banas, Casey, "From the Local Perspective," NASSP Bulletin 66:43-48, April, 1982. (50, 56)

Becker, Jerry P., "1979 National Middle School Mathematics Olympiads in the Republic of China," The Mathematics Teacher 75:161-168, February, 1982. (32, 55)

Bell, Terrel H., "From the National Perspective," NASSP Bulletin 66:3-6, April, 1982. (47, 54)

Benson, Bernard W., "Refreshing the Teaching Spirit," The Science Teacher 49: 39-41, September, 1982. (40)

Bohning, James J., "Remedial Mathematics for the Introductory Chemistry Course: The 'Chem 99' Concept," Journal of Chemical Education 59:207-208, March, 1982. (40,54)

Brinckerhoff, Richard F., "Talks with Great Teachers: Gerald Holton," The Physics Teacher 20:602-611, December, 1982. (3, 15, 56, 58)

Campbell, Anne, "From the State Perspective," NASSP Bulletin 66: April, 1982. (52, 57)

Chavez, Annette, and Widmer, Connie C., "Math Anxiety: Teachers Speak for Themselves," Educational Leadership 39:387-388, February, 1982. (22, 56)

Clarke, Gertrude M., "Teaching Physics at Chatham High School," The Physics Teacher 18:352-357, May, 1980. (40)

Clark-Meeks, Loretta F., Quisenberry, Nancy L., and Mouw, John T., " A Look at the Mathematics Attitudes of Prospective Teachers in Four Concentration Areas," School Science and Mathematics LXXXII:317-320, April, 1982. (10, 12, 22, 56, 57)

Cogan, John J., "Education and Development in the Third World," Educational Leadership 39:430-432, March, 1982. (33, 57)

Corrigan, Dean C., and Imig, David, "Turning Teacher Education Around," The Education Digest XLVIII:34-35, October, 1982. (11, 23, 56, 58)

DeVault, M. Vere, and Weaver, J. Fred, "Forces and Issues Related to Curriculum and Instruction K-6," in A History of Mathematics Education in the United States and Canada, National Council of Teachers of Mathematics, Washington, D.C., 1970, 557 pp. (15, 57)

Donnelly, Harrison, "Students' Declining Science and Math Ability May Lead to New Federal Program," South Bend Tribune, December 19, 1982, p. 21. (41)

Ernest, John, Mathematics and Sex, Triple R Press, Goleta, CA, 1976, 30 pp. (41, 53)

Fennema, Elizabeth and Carpenter, Thomas P., "Sex-Related Differences in Mathematics: Results from National Assessment," The Mathematics Teacher 74: 554-559, October, 1981. (24, 12)

Fox, Lynn H., Brody, Linda, and Tobin, Dianne, Women and the Mathematical Mystique, Johns Hopkins University Press, Baltimore, 1980, 211 pp. (15)

Frye, Charles M., "Who Runs the Schools?," Newsweek XCIV:13, September 3, 1979. (16, 53, 54, 56)

Frye, David, "From the Local Perspective," NASSP Bulletin 66:37-43, April, 1982. (50, 57)

Galbraith, P. L., "The Mathematical Vitality of Secondary Mathematics Graduates and Prospective Teachers: A Comparative Study," Educational Studies in Mathematics 13:89-112, February, 1982. (10, 12, 24, 55, 58)

Gardner, John W., Excellence, Harper & Row, Publishers, New York, New York, 1961, 206 pp. (1, 2, 3, 4)

"Global Education Grants," The Education Digest XLVIII:75-76, October, 1982. (41)

Golden, Lester, "School Program Emphasizes Global Inter-dependence," NASSP Bulletin 66:116-118, April, 1982. (33, 54)

Goldhammer, Keith, "Hallmarks for Excellence in Teacher Education," Journal of Teacher Education XXXII:25-29, September-October, 1981. (16, 54, 56, 57, 58)

Greer, Peter R., "Letting Administrators Decide Who the Best Teachers Are," The Education Digest XLVIII:26-27, October, 1982. (25, 56)

Haladyna, Tom, Shaughnessy, Joan, and Shaughnessy, J. Michael, "A Causal Analysis of Attitude Toward Mathematics," Journal for Research in Mathematics Education 14:19-29, January, 1983. (25, 57)

Harrison, Anna J., "In Search of New Initiatives," Journal of Chemical Education 59:713-716, September, 1982. (25)

Hazard, William R., "Educational Malpractice," The Education Digest XLVIII:24-25, October, 1982. (16)

Henchley, Norman, "The Future of Canadian Education," The Education Digest XLVIII: 65-68, September, 1982. (34, 55)

Hestenes, David, "Wherefore Science of Teaching?," The Physics Teacher 17:235-242, April, 1979. (8, 26, 56, 57, 58)

Hirstein, James J., "The Second National Assessment in Mathematics: Area and Volume," The Mathematics Teacher 74:704-708, December, 1981. (17, 57)

Hoosier Association of Science Teachers, Inc., "In Pursuit of Excellence in Science Education, " Indianapolis, Indiana, February 11-12, 1983 Conference. (42, 57)

Howard, James, "The Time for Basic Education," The Education Digest XLVIII:8-9, September, 1981. (26, 58, 59)

Hudson, H. T., and Rottman, R. M., "Mathematics Ability of Beginning Physics Students," The Physics Teacher 18:305, April, 1980. (17, 54)

"Improving America's Foreign Language Competence," Today's Education 69:72-73, September/October, 1980. (34, 54)

Jones, Phillip S., and Coxford, Arthur F., "Mathematics in the Evolving Schools," in A History of Mathematics Education in the United States and Canada, National Council of Teachers of Mathematics, Washington, D.C. 1970, 557 pp. (27, 54)

Kapuscinski, B. Phyllis, "The Purpose of Laboratory Instruction in High School Chemistry," The Education Digest XLVIII:53-55, September, 1981. (42, 57)

Keisling, Phil, "How to Save the Public Schools," The New Republic:27-32, November 1, 1982. (17, 58)

Kilpatrick, James J., "Our Vulnerability in Knowledge Gap," South Bend Tribune, December 13, 1982, p. 10. (27,53,55,56)

Kirwan, Donald F., "R. Bruce Lindsay," The Physics Teacher 20:366-371, September 1982. (28, 53, 54, 56)

Klausmeier, Herbert J., "A Research Strategy for Educational Improvement," The Education Digest XLVIII:19-22, September, 1982. (42, 57)

Koerner, Thomas F., and Bruce, Carol, "Determining the Priorities of American Secondary Education, A Consideration of the State of American Secondary Schools," NASSP Bulletin 66:1-74, April, 1982. (47)

Lagowski, J., "Patterns in Education," Journal of Chemical Education 59:893, November, 1982. (18, 54)

Lewis, John L., "International Organization for Teaching Physics," The Physics Teacher 18:268-271, April, 1980. (34)

Lin, Herbert, "Learning Physics VS. Passing Courses," The Physics Teacher 20: 151-157, March, 1982. (18, 54, 56, 57)

Long, Sandra M., "An American Profile: Trends and Issues in the 1980's," Educational Leadership 39:460-464, March, 1982. (18, 56)

Lugar, Richard G., Bill S.2919, 97th Congress, Second Sesstion, September 16, 1982. (38, 55)

McCormack, Patricia, "For Math Teacher, Jobs, Higher Pay," South Bend Tribune, September 25, 1982, p. 25. (11, 28, 54, 58)

McGuire, Willard, "From the National Perspective," NASSP Bulletin 66:28-31, April, 1982. (49, 56)

McKenzie, Malinda L., and Budd, Karen S., "A Peer Tutoring Package to Increase Mathematics Performance: Examination of Generalized Changes in Classroom Behavior," Education and Treatment of Children 4:1-14, Winter, 1981.

MacNow, Glen, "Science Education is Taking a Beating," Detroit Free Press, October 11, 1981, p. 1B. (35, 55)

Morimoto, Takiko, "Contrasting Attitudes of Japanese and American Teachers," Educational Leadership 39:414-415, March, 1982. (35, 55)

Muessig, Raymond H. and Gilliom, M. Eugene, "Perspectives of Global Education: A Sourcebook of Classroom Teachers," Eric Document, 80 pp. 1981, ED 207 857. (43, 57)

Nelson, David, Thompson, Reuben, and Dickens, Lloyd, "What Can Principals Do to Improve Competency, Proficiency Testing?" NASSP Bulletin 66:19-29, May, 1982. (8, 29, 56)

"New Projects," The Mathematics Teacher 74:570-571, October, 1981. (43)

Nickerson, Neal, "From the Local Perspective," NASSP Bulletin 66:50-52, April, 1982. (51, 56)

Nielsen, Lloyd, "From the National Perspective," NASSP Bulletin 66:27, April, 1982. (48)

Opel, John R., "Education, Science, and National Economic Competitiveness," Science 217:1116-1117, September, 1982. (19, 53, 54)

Osborne, Alan R., and Crosswhite, F. Joe, "Forces and Issues Related to Curriculum and Instruction," pp. 155-196, in A History of Mathematics Education in the United States and Canada, National Council of Teachers of Mathematics, Washington, D.C. 1970, 557 pp. (3, 29)

Osen, Lynn M., Women in Mathematics, The MIT Press, Cambridge, Massachusetts, and London, England, 1974. 184pp. (29, 53, 58)

Permuth, Steve, "From the Local Perspective," NASSP Bulletin 66:53-53, April, 1982. (51, 54)

Popkewitz, Thomas S., and Tabachnick, B. Robert, "Themes in Current Soviet Curriculum Reform," Educational Leadership 39:420-424, March, 1982. (8, 35 55)

Purves, Alan C., and Travers, Kenneth J., "International Evaluation and American Curriculum," Educational Leadership 39:440-446, March, 1982. (36, 59)

Quie, Al, "From the State Perspective," NASSP Bulletin 66:65-68, April, 1982. (52, 54)

Raelin, Joseph A., "A Comparative Analysis of Female-Male Early Youth Careers," Industrial Relations 21:231-245, Spring, 1982. (10, 19)

Randour, Mary Lou, Strasburg, Georgia L., and Lipman-Blumen, Jean, "Women in Higher Education: Trends in Enrollments and Degrees Earned," Harvard Review 52:189-201, May, 1982. (2, 7, 9, 20, 53)

Reed, Vincent, "From the Local Perspective," NASSP Bulletin 66:33-37, April, 1982. (49)

Renner, John W., "Priorities for Research in Science Education: A Survey," Eric Document, 21 pp., 1981, ED 207 855. (44, 56, 58)

Robinson, Bryan E., "Male Early Childhood Teachers: Changing Views," The Education Digest XLVII:12-14, November, 1981. (7, 12, 30, 54)

Rowan, Carl T., "Lip Service for Education," South Bend Tribune, September 21, 1982, p. 10. (30)

Saperstein, Alvin M., "Why Study Physics?," The Physics Teacher 18:456-457, September, 1980. (44, 54)

Scannell, Dale P., and Guenther, John E., "A Five-Year Program for Teacher Education," The Education Digest XLVIII:10-12, September, 1981. (44, 59)

Schiller, Diane Profita, and Walberg, Herbert J., "Japan A Learning Society," The Education Digest XLVIII:66-68, October, 1982. (12, 36, 55)

Schwartz, Elaine B., "China - Summer 1981," Educational Leadership 39:429, March, 1982. (37, 55)

"Scientific Manpower Commission," NSTA Report, September, 1982. (12, 45)

Sizer, Theodore R., "From the National Perspective," NASSP Bulletin 66:19-24, April, 1982. (48, 56)

Smith, George, "From the State Perspective," NASSP Bulletin 66:56-60, April, 1982. (51, 54)

Smith, John P., "Education in China," Educational Leadership 39:426-428, March, 1982. (1, 37, 54, 55)

Starr, Frederick S., "International High Schools," The Education Digest XLV:14-16, November, 1979. (37, 54).

Swartz, Clifford E., "Is This Generation Different?," The Physics Teacher 16:602, December, 1978. (2, 20, 56)

Swetz, Frank J., Mathematics Education in China: Its Growth and Development, MIT Press, Cambridge, Massachusetts, 1974, 364 pp.

Swetz, Frank J., "Teaching Physics in China," The Physics Teacher 18:362-366, May, 1980. (38, 55)

Thomson, Scott D., "From the National Perspective," NASSP Bulletin 66:7-19, April, 1982.

"U.S. Watchdog Role Over Russia 'Slipping'," South Bend Tribune, September 23, 1982, p.18. (38, 54)

Wallace, Charles W., "Dissemination Strategies at the National Science Foundation in Pre-College Education," Eric Document, 8 pp., April, 1981, ED 207 857. (45, 58)

"Westside Story," Time 110:39, December, 1977. (45, 55)

Whitaker, Donald R., "Mathematical Problem Solving Performance as Related to Student and Teacher Attitudes," School Science and Mathematics LXXXII: 217-223, March, 1982. (7, 31, 54, 57)

Whitesitt, John, "Mathematics for the Average College-Bound Student," The Mathematics Teacher 75:161-168, February, 1982. (21, 54)

Williams, Robert T., "Beneath the Surface of the Mathematics Teacher Shortage," The Mathematics Teacher 74:691-694, December, 1981. (21, 55)

Yager, Robert, "From the President," NSTA Report, September, 1982, p.1. (31, 54, 57)

Yager, Robert, "Editor's Corner," The Science Teacher 49:10, September, 1982. (46)

Yager, Robert, "Message from the President," NSTA Report, January, 1983, p.1. (12, 46)

Zisenwine, David, "American Curriculum Abroad," Educational Leadership 39:416-419, March, 1982. (39, 13)

APPENDICES

APPENDIX A

Three instruments used in Whitaker's Attitudinal Research of Attitude and Mathematics Problem-Solving:

1. Mathematical Problem-Solving Test: a unique test developed by Romberg and Wearne in 1976 designed to yield a comprehensive application and problem-solving score.

2. Student Mathematical Problem-Solving Attitude Scale: a Likert type format designed to elicit students' attitudes regarding problem-solving in mathematics.

3. Teacher Mathematical Problem-Solving Attitude Scale: a Likert type format designed to elicit teachers' attitudes regarding problem-solving in mathematics.

(Whitaker: 219-220)

APPENDIX B

Peer Tutor Package: a treatment package implemented to improve mathematics performance and classroom behavior consisting of the following three components:

1. Peer help/reinforcement on daily assignments

2. More structured feedback and instruction by peer than is offered to the entire class

3. Incentive-based priviledges contingent upon accuracy of work rather than work completion

(McKenzie: 1)

APPENDIX C

Chronology: the following chronology table provides historical context for the events, various legislations, publications, commissions, and associations mentioned in this literature search. Those events not specifically mentioned in the annotations are included as relevant to the current status of excellence in American public education. It is by no means a complete listing.

1745 Yale included arithmetic as a requirement for admission

1820 Harvard included algebra as a requirement for admission

1848 American Association for the Advancement of Science (AAAS) founded

1852 Massachusetts passed the first compulsory school-attendance law

1857 National Teachers Association (NTA) founded

1863 National Academy of Sciences (NAS) founded

1870 National Education Association (NEA) founded

1894 American Mathematical Society (AMS) founded

1895 National Science Teachers Association (NSTA) founded

1899 Presentation of the report of NEA Committee of Fifteen on college entrance requirements

1900 The College Board Testing program (TCB) founded

1901 National Society for the Study of Education (NSSE) founded

1903 School Science and Mathematics Association (SSMA) founded

1904 National Association of Secondary School Principals (NASSP) founded

1911 College Entrance Examination Board (CEEB) founded

1912 Presentation of reports of the International Commission on Teaching of Mathematics comparing training of teachers here and abroad

1915 Mathematical Association of America (MAA) founded

1916 American Federation of Teachers (AFT) founded

1920 National Council of Teachers of Mathematics (NCTM) founded

1921 NCTM took over publication of Mathematics Teacher from ATM

1921 National Association of Elementary School Principals (NAESP) founded

1933 MAA appointed Commission on Training and Utilization of Advanced Students of Mathematics

1935 CEEB announced new mathematics examinations

1935 Presentation of report, "On the Training of Teachers of Mathematics," by a subsommittee of the Commission on the Training and Utilization of Advanced Students of Mathematics

1935 Appointment of Joint Commision of MAA and NCTM to study the place of mathematics in general education

1938 National Council on Measurement in Education (NCME) founded

1939 WORLD WAR II broke out

1940 Presentation of report of Joint Commission on the place of mathematics in secondary education

1940 War Preparedness Committee appointed by AMS and MAA

1941 The Science Talent Seach (STS) initiated

1941 Letter by Admiral Nimitz published, stating that naval officer candidates were weak in mathematics

1941 United States entered WORLD WAR II

1944 NCTM appointed Commission on Post-War Plans

1947 Educational Testing Service (ETS) founded

1950 National Science Foundation (NSF) established by act of congress

1953 Scientific Manpower Commission (SMC) founded

1954 ETS supported the study published as Problems in Mathematics Education

1955 CEEB began the Advanced Placement program

1957 Preparation of Secondary School Curriculum supported by NSF for the purpose of producing materials in physical science

1957 October 4, Sputnik orbited the earth

1958 School Mathematics Study Group (SMSG) initiated by professional mathematicians and supported by NSF

1959 Presentation of report, "Secondary Mathematics Curriculum," by the Secondary School Curriculum Committee of NCTM

1960 International Association for the Evaluation of Educational Achievement (IEA) founded

1961 "The Revolution in School Mathematics," published by NCTM

1961 Presidential Commission on Status of Women formed by President John F. Kennedy

1963 Equal Pay Act passed

1964	Title VII of the Civil Rights Act prohibited against sex discrimination in employment
1969	International Association of Educators for World Peace (IAEWP) founded
1971	Association for Women in Mathematics (AWM) founded
1972	Equal Opportunity Act (amendment to Title VII) extended prohibition of sex-discrimination to cover employment in educational institutions
1977	Project Synthesis initiated by NSF to assess status of U.S. science education
1978	Women and Mathematics Education (WME) founded
1979	International Association for the Study of Cooperation in Education (IASCE) founded
1981	Education Consolidation Act (block grants) passed for the purpose of educational improvement
1982	Search for Excellence in Science Education initiated by NSTA and supported by NSF
Pending	Lugar's Soviet-Bloc Research and Training Act of 1982 (Bill S.2919)
Pending	Pre-College Mathematics and Science Teachers Assistance Act

Primary sources other than annotations:

1) NCTM Yearbook: 1970
2) Akey: 1983

NATIONAL COUNCIL OF
Teachers of Mathematics
1906 Association Drive Reston, Virginia 22091 ■ (703) 620-9840

APPENDIX D

MATHEMATICS TEACHER SHORTAGE
An NCTM Fact Sheet

National Perspective

1. Mathematics teaching has the severest shortages of any subject area in 1981. (Teacher Supply and Demand 1982, Association of School, College and University Staffing.)

2. Since 1972 there has been a 77 percent decline in the number of secondary-level mathematics teachers prepared in 600 teacher-training programs nationwide. Among newly employed science and mathematics teachers, 50.2 percent were judged by principals to be unqualified to teach in those fields, but had been employed on an emergency basis because school officials could not find qualified teachers. In the Pacific States the ratings of unqualified personnel jumps to 84% by the principals. (Education Week, 31 March 1982.)

3. Only 55% of the graduates prepared to teach mathematics actually entered the teaching profession. Almost five times more science and mathematics teachers left teaching in 1980 for employment in nonteaching jobs than left due to retirement. If the present exodus of qualified science and mathematics teachers from secondary schools continues, the nation will have a net loss of 35% by 1992. The declines in qualified science and mathematics teachers have already exceeded enrollment declines by a factor of three. (Testimony of Sarah E. Klein, President of the National Science Teachers Association, before the Committee on Labor and Human Resources of the United States Senate, 1982.)

4. For fall 1980 the supply of mathematics teachers was only 78% of the demand. (Teacher Supply and Demand in Public Schools, 1980-81, NEA Research Memo.)

5. 43 of the 45 reporting states indicated a shortage or critical shortage of secondary mathematics teachers in 1981. ("National Study of the Estimated Supply and Demand of Secondary Science and Mathematics Teachers" by Trevor G. Howe and Jack A. Gerlovich. Prepared for the High School Chemistry Teacher Conference, Columbia, Missouri, 6 November 1981.)

6. "Alleviating the math-teacher shortage is one of the most immediate and pressing tasks facing colleges and school systems." (U. S. News and World Report, 15 February 1982.)

7. "A shortage of mathematics and science teachers hampers the ability of the schools to provide science and mathematics instruction." (Science & Engineering Education for the 1980's & Beyond, National Science Foundation and Department of Education, October 1980.)

Selected States

1. North Carolina: In 1979-80 only 55% of the mathematics teachers in the state were certified to teach mathematics. (Mathematics Teacher, December 1981.)

2. Missouri: Only about 40 of the 80 prospective mathematics teachers who will graduate from Missouri's teaching institutions are expected to be teaching the following fall, although at least 200 vacancies are expected in the state. (Kansas City Times, 21 May 1982.) There was a 43% increase in the issuance of emergency certification in 1979 vs. 1978. (Mathematics Teacher, March 1981.)

3. New York: The nation's second-most populous state, had only 32 college graduates planning to teach junior or senior high school mathematics in 1982. New Hampshire: Only one college graduate in the state in 1982 is planning on a career in mathematics teaching. (Christian Science Monitor, 12 July 1982.)

4. California: Of the more than 400 000 students in California's public four-year institutions in the spring of 1982, only 97 were preparing to be secondary mathematics teachers. (Phi Delta Kappan, September 1982.)

5. Texas: Only 20 new mathematics teachers graduated in the state in 1982, and only 7 went into teaching. (Mesquite Daily News, 11 May 1982.)

6. Maryland: A survey by the State Department of Education at the end of the 1979-80 school year estimated that 50,000 secondary students received their mathematics instruction from more than 400 teachers who were not certified to teach secondary mathematics. (School, March/April 1981.) In 1982 only 17 new mathematics teachers graduated in the state and 8 went into teaching. (Clarence Miller, Maryland State Department of Education, June 1982.)

7. Connecticut: Last year the state lost 100 mathematics teachers through retirement or job shifts while only 28 mathematics teachers graduated from the 14 state institutions. (Steve Leinwand, Connecticut Department of Education, September 1982.)

8. New Jersey: The State Department of Education has declared an emergency shortage of mathematics teachers in 17 of New Jersey's 21 counties. This emergency designation permits districts to use unlicensed teachers--some without bachelor's degrees--to teach the subject. (Star-Ledger, 13 September 1982.)

OVER

9. Iowa: The number of graduates prepared to teach mathematics declined from 234 in 1970 to 60 (-74%) in 1979. The number of vacancies in that period fluctuated between 200 and 250 each year. Shortages are most severe in smaller school districts. (School Science and Mathematics, January 1982.)

10. Mississippi: State Superintendent of Education Charles Holladay reported that state institutions are not even close to providing the 400 to 500 mathematics teachers that will be needed this year. (Jackson Daily News, 9 July 1982.)

Some Solutions

1. Nationally: John Glenn (D-Ohio) and Dave McCurdy (D-Oklahoma) have introduced a "Precollege Mathematics and Science Teacher Assistance Act" which amends the Title IV of the Higher Education Act of 1965 to provide direct loans (7% interest) to college students preparing to be elementary and secondary mathematics and science teachers. Their "Precollege Mathematics and Science Education Act" amends the Internal Revenue Code to allow a credit for high technology employers who hire precollege mathematics and science teachers for the summer. A credit is also provided to firms that allow full-time employees the hours away from work to teach mathematics and science in public schools. (Both bills are being considered by the House Science and Technology Committee, July 1982.)

2. Alabama: Undergraduates who seek mathematics teaching certification are eligible for loans for tuition, books, room and board for each year of full-time study. For each year of teaching experience, one year of the scholarship will be forgiven. Teachers with six hours of mathematics (college algebra or higher level courses) are eligible for a permit to teach vocational and general mathematics at the seventh and eighth grade levels. The certificate is renewable upon entry into a state approved program leading to full certification. (William Berryman, Alabama State Department of Education, July 1982.)

3. Kentucky: Undergraduates who seek mathematics teaching certification are eligible to receive $2500 loans beginning with their sophomore year. A year of the loan will be forgiven for each year of teaching. Certified teachers in other fields who attend summer school to become certified to teach mathematics will qualify for up to one-third of the loan amount. (Lydia Sledge, Kentucky Department of Education, July 1982.)

4. California: 15 million dollars has been set aside for this fiscal year for upgrading skills of mathematics and science teachers in grades K-12 through offerings of 15 regional centers around the state. (Joe Hoffman, California State Department of Education, September 1982.)

5. Houston, Texas: Critical staff stipends for mathematics teachers are $800 a year and may soon be increased to $2000. As part of Project Search, tuition and book costs as well as $250 per course were paid to selected experienced teachers who completed a summer program of four three-hour courses with a grade of B or better. Through this process, teachers were able to earn the 15 credit hours needed for temporary middle school certification then full certification with 18 credit hours. (Mira Baptiste, Houston Independent School District, September 1982.)

6. Oklahoma City, Oklahoma: Certified mathematics teachers new to the system receive a $500 bonus. All certified mathematics teachers are eligible to receive an extra $100 per course taught each year. (Carl Ruble, Oklahoma City Schools, July 1982.)

7. Richmond, Virginia: Certified mathematics teachers who are hired by the Richmond schools receive a $2000 bonus for signing—$1500 for the first year and $500 the second year. Teachers who leave before two years must pay back a portion of the bonus. (Jerry Owens, Richmond Public Schools, August 1982.)

8. Philadelphia, Pennsylvania: Selected teachers will participate in a 3-year program resulting in certification and will be guaranteed jobs teaching mathematics. (Philadelphia Inquirer, 9 February 1982.) Vacancies in the middle and junior high school level are being filled with people who have no background in secondary school mathematics. (Pennsylvania Council of Teachers of Mathematics Newsletter, March 1981.)

9. Dallas, Texas: $500 000 has been allotted for tuition, books and transportation for teachers who wish to upgrade their skills in mathematics and for those who wish to gain certification in mathematics. (Mary Lester, Dallas Public Schools, July 1982.)

10. Fairfax County, Virginia: Teachers who have been in the school system for four years and who wish to earn mathematics teaching certification (27 hours) may enroll in a series of courses through Northern Virginia Community College and a local four-year university. The tuition is paid but teachers must teach in the system for three years after gaining certification or repay tuition costs. (Sylvia Auton, Fairfax County Schools, July 1982.)

11. Palm Beach County, Florida: Teachers not certified to teach middle or junior high school mathematics can gain certification by taking a sequence of three state certified courses. Tuition is free to teachers. (Ruth Bower, Palm Beach County Public Schools, July 1982.)

The Experiment In International Living and The School For International Training

International Educational Exchange Programs
International Graduate & Undergraduate Degree Programs

U.S. HEADQUARTERS IN BRATTLEBORO, VERMONT 05301 TELEPHONE (802) 257-7751

The Experiment

The Experiment in International Living, a private, non-profit organization, has been the leader in the field of international educational exchange since 1932, when the first Experimenters travelled abroad under the direction of founder Dr. Donald B. Watt. The oldest organization of its kind in the world, The Experiment has evolved into a world-wide endeavor to promote understanding among the peoples of the world through travel, language learning, cross-cultural orientation and the homestay, in which people of different cultures learn about each other by living together as members of a family. This effort is administered by autonomous National Offices in 60 countries and an International Secretariat based in The Netherlands. More than 200,000 people have participated in EIL's programs both abroad and here in the United States.

EIL offers Summer Abroad and Academic Semester Abroad programs to U.S. High School and college students, and adults. In addition, international visitors from more than 30 countries enjoy The Experiment's programs in the U.S.

The School

The Experiment's academic facility, The School for International Training, was founded in 1964 in response to the need for professional training for graduate students wishing to enter international careers. SIT is a senior college and graduate school, fully accredited by the New England Association of Schools and Colleges which accredits schools and colleges in the six New England States.

Membership in the Association indicates that the institution has been carefully evaluated and found to meet the standards agreed upon by qualified educators.

SIT offers Master's-degree programs in international and intercultural management and the Teaching of Languages, and a Bachelor's-degree program in international studies.

Central to the School's experience-based learning approach is the domestic or international internship, usually served after the initial 4–6 month semester on SIT's campus, and followed by a shorter semester evaluation which is also held on campus.

SIT students and graduates have obtained internships and employment with international organizations and institutions which include: Save The Children, CARE, Inc., World Bank, Catholic Relief Services, The Peace Corps, Alaska State Commission on Human Rights, the Language Institute of Japan, International Women's Tribune Center, Chiang Mai University (Thailand), Planned Parenthood, and World Neighbors.

STUDENT QUALIFICATIONS

Name: Ruth Downing Miano

Education: Rift Valley Academy, Kenya, H.S. diploma, 1961

Wheaton College, Illinois, B.A., 1965
Major: Mathematics
Minors: Latin, Education

University of Notre Dame, 9 hours, 1979
Mathematics on National Science Foundation grant

Indiana University at South Bend, M.Ed., 1982(?)
Major: Secondary Education

Experience: Teacher, Grades 7, 8, 9, 1965-1967
William Hatch School, Oak Park, Illinois

Teacher, Grades 7, 8, 9, 1967-1969
Rift Valley Academy, Kenya, East Africa

Teacher, Grades 7, 8, 9, 1969-1970
Mitchell School, Racine, Wisconsin

Teacher, Grades 9, 10, 11, 12, College Freshman, 1970-1977
International School of Kenya, Nairobi

Teacher, Business Mathematics, 1978-1979
IVY Tech, South Bend, Indiana

Teacher, Grades 9, 10, 11, 12, 1978-present
Saint Joseph's High School, South Bend, Indiana

Rationale: My teaching experience has been in two countries: the United States and Kenya. I have spent approximately half of my total teaching years in each country. The common denominator has been that I have taught the general American curriculum using American texts in systems designed to prepare students for colleges and universities in the United States.

It seems that our educational system tends to isolate us from the world, and to give us the false security that the world is out there ready to learn from us by our standards. I am concerned about an educational system that produces citizens who fail to see the value of knowing the culture and language of the world powers with whom we have business, political, and diplomatic interests. I am also concerned that it satisfies itself with national norms rather than international norms. My proposed research is concerned with the decline in the rigor in American education primarily as it is evidenced in mathematics, science, and language.